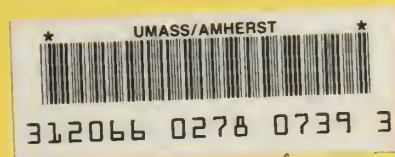


MASS. MP03.2: B76



# CTPS TECHNICAL REPORT

# 59

## BRIDGE STREET BYPASS IN SALEM AND BEVERLY: TRAFFIC FORECASTS

GOVERNMENT DOCUMENTS  
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# CTPS TECHNICAL REPORT 59

**TITLE** BRIDGE STREET BYPASS IN SALEM AND BEVERLY:  
TRAFFIC FORECASTS

**AUTHOR(S)** WILLIAM T. STEFFENS  
DEMITRIOS ATHENS  
EDWARD J. BROMAGE

**DATE** APRIL 1987

**ABSTRACT** Traffic-volume forecasts for the AM and PM peak hours in 1985 and 2005 have been produced for the Bridge Street bypass. A 1985 baseline trip table was developed from an extant trip table that was adjusted to achieve consistency between observed volumes and traffic assignments. The baseline trip table was factored to 2005 using the Fratar procedure, for which household and employment projections reported by the Metropolitan Area Planning Council served as a basis. The 1985 and 2005 trip tables were assigned to the Bridge Street bypass network in the final step of the process.

This document was prepared by **CENTRAL TRANSPORTATION PLANNING STAFF**, an interagency transportation planning staff created and directed by the Metropolitan Planning Organization, consisting of the member agencies.

**Executive Office of Transportation and Construction**  
**Massachusetts Bay Transportation Authority**  
**Massachusetts Department of Public Works**  
**MBTA Advisory Board**  
**Massachusetts Port Authority**  
**Metropolitan Area Planning Council**

**AUTHOR(S)**

William T. Steffens  
Demitrios Athens  
Edward J. Bromage

**GRAPHICS**

David B. Lewis  
Mary Kean

**EDITING**

Leland N. Morrison

**WORD PROCESSING**

Olga Doherty  
Sybil White  
Deborah Picot

MAPC REGION  
BOUNDARY



STUDY AREA



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## TABLE OF CONTENTS

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LIST OF FIGURES	v
1 INTRODUCTION	1
1.1 Background	1
1.2 Purpose	1
2 METHOD	3
2.1 Highway Network	3
2.2 Traffic Counts	3
2.3 AM- and PM-Peak-Hour Traffic-Count Balancing	6
3 TRAVEL-DEMAND FORECASTS	11
3.1 Existing Travel-Demand Conditions	11
3.2 Future Travel-Demand Conditions	12
4 TRAFFIC ASSIGNMENTS	13
4.1 Base Year (1985)	13
4.2 Future Year (2005)	13
APPENDICES (itemized in List of Figures)	



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## LIST OF FIGURES

---

1-1	Study Area and Bridge Street Bypass Alignment	2
2-1	Automatic Traffic Recorder Count Locations in Salem	4
2-2	Automatic Traffic Recorder Count Locations in Beverly	5
2-3	Manual Turning Movement Count Locations in Salem	7
2-4	Manual Turning Movement Count Locations in Beverly	8
4-1	Base-Year (1985) AM-Peak-Hour Forecast, Bypass Network	15
4-2	Base-Year (1985) PM-Peak-Hour Forecast, Bypass Network	16
4-3	Future-Year (2005) AM-Peak-Hour Forecast, Bypass Network	17
4-4	Future-Year (2005) PM-Peak-Hour Forecast, Bypass Network	18
APPENDIX A	1985 AM- and PM-Peak-Hour Balanced Volumes Used in Calibration	
A-1	AM Peak Hour, Salem	21
A-2	AM Peak Hour, Beverly	22
A-3	PM Peak Hour, Salem	23
A-4	PM Peak Hour, Beverly	24
APPENDIX B	AM- and PM-Peak-Hour Turning Movement Summaries by Intersection (Bypass Network)	
B-1	1985 AM Peak Hour	27
B-2	1985 PM Peak Hour	43
B-3	2005 AM Peak Hour	59
B-4	2005 PM Peak Hour	75







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## 1 INTRODUCTION

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### 1.1 BACKGROUND

As originally proposed by the Massachusetts Department of Public Works (MDPW), the Peabody-Salem Connector was intended to join the Salem-Marblehead area with Route I-95 north in Peabody. The Beverly-Salem component of the proposal was viewed as a link in a system of expressway-scaled connectors which were to remove traffic from overloaded local streets.

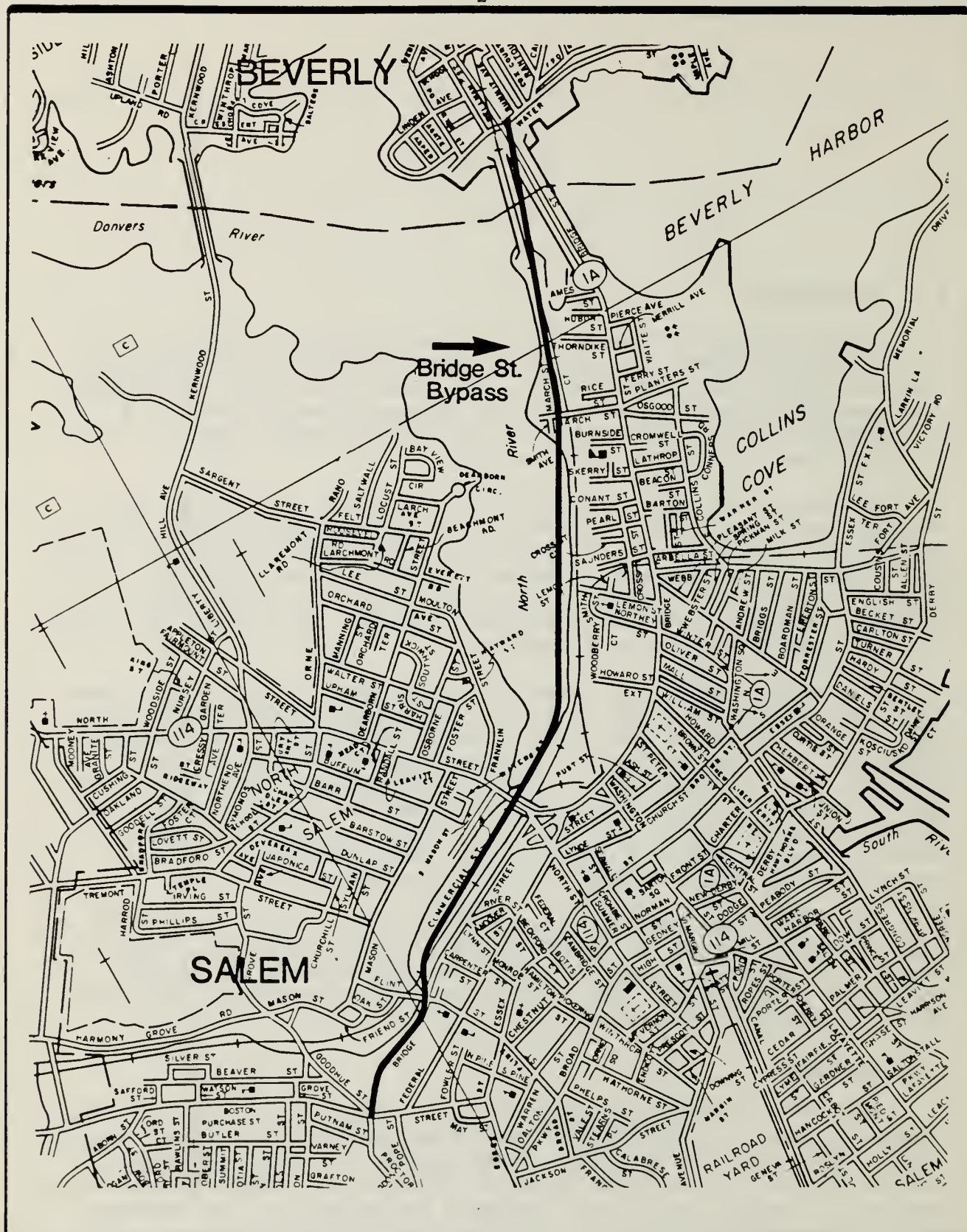
The decision not to construct I-95 north led the Boston Transportation Planning Review to develop an alternative plan for the Beverly/Salem area. An arterial-scaled Beverly-Salem bridge and Bridge Street bypass in Salem would join North Street in Salem to Cabot and Rantoul streets in Beverly. A Peabody-Salem connection would link North Street to Route 128 between the Route 114 and Lowell Street interchanges.

The presentation of these plans for public review and comment eventually resulted in the elimination of the largest portion of the project--the Peabody-Salem connection. In Peabody, there was citizen opposition to the location of an at-grade facility near the center of Peabody and concern about the fact that a large share of the project mileage to be built would be through Peabody. This led first to a revision in the MDPW construction schedule and finally to the elimination of the Peabody-Salem segment from further consideration.

CTPS produced traffic forecasts for the originally proposed Peabody-Salem Connector in 1977-1978. These forecasts were revised in 1981 and 1982 to allow for the effects of staged construction. At that time CTPS produced design-year 1985 and 2000 PM-peak-hour forecasts.

### 1.2 PURPOSE

The MDPW is now preparing for the construction of a Bridge Street bypass which begins at the intersection of Bridge, Boston, and Goodhue streets in Salem, runs parallel to Bridge Street (Route 1A) on the northern side of Bridge, and ends at the intersection of Cabot and Rantoul streets in Beverly. The project study area and the alignment of the bypass are shown in Figure 1-1. The objective of the CTPS effort documented in this report was to produce 1985 and 2005 AM- and PM-peak-hour traffic forecasts for this new project, which is no longer part of a larger Peabody-Salem connector project.



Bridge St. Bypass  
in Salem & Beverly



Technical Report 59  
April 1987

STUDY AREA  
AND  
BRIDGE STREET BYPASS ALIGNMENT

**CTPS**

**FIGURE**

1-1



---

## 2 METHOD

---

### 2.1 HIGHWAY NETWORK

The first step of the traffic-forecasting process was to verify the characteristics of the original computer representation of the highway network in the Peabody/Salem study area. The MDPW provided field data for this purpose, and CTPS checked roadway speeds, capacities, and direction of flow for accuracy. Minor adjustments were made to update link connections and link flow directions.

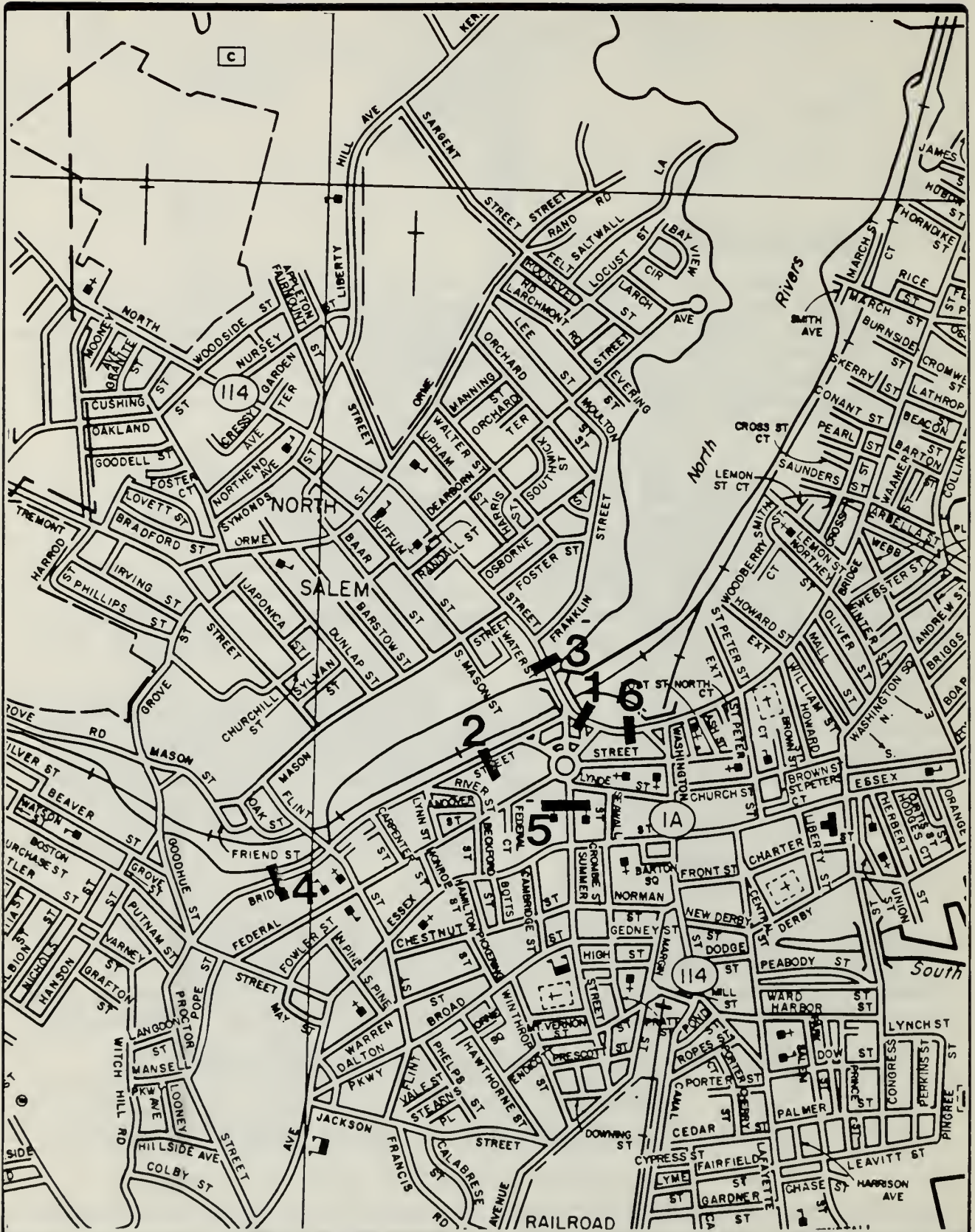
The original network was converted to a microcomputer-processible format to facilitate anticipated network editing and to make possible the use of a package of suitable microcomputer-based traffic-modeling programs. Although the 41 traffic zones in the original network were maintained, the network was modified slightly by eliminating certain details in the Route 128 area that were previously necessary for consideration of the Peabody-Salem connector. The updated network was used for modeling baseline conditions.

For the purpose of projecting current and future traffic demands on the Bridge Street bypass, the updated, baseline network was further modified. The new bypass links and planned changes in travel direction and link connections were coded into the network file to represent the bypass itself and the related transportation improvements included in the proposal.

### 2.2 TRAFFIC COUNTS

In February 1985, the MDPW took ten automatic-traffic-recorder (ATR) counts at six stations in Salem and four stations in Beverly; the locations are shown in Figures 2-1 and 2-2. These counts were taken for a 48-hour period beginning at 1:00 PM on a Tuesday. The ten ATR stations were located as follows:

- Salem
1. Bridge Street ramp westbound to Route 114 westbound
  2. Bridge Street east of River Street
  - 3E. North Street eastbound, south of Franklin Street
  - 3W. North Street westbound, south of Franklin Street



Bridge St. Bypass  
in Salem & Beverly



Technical Report 59  
April 1987

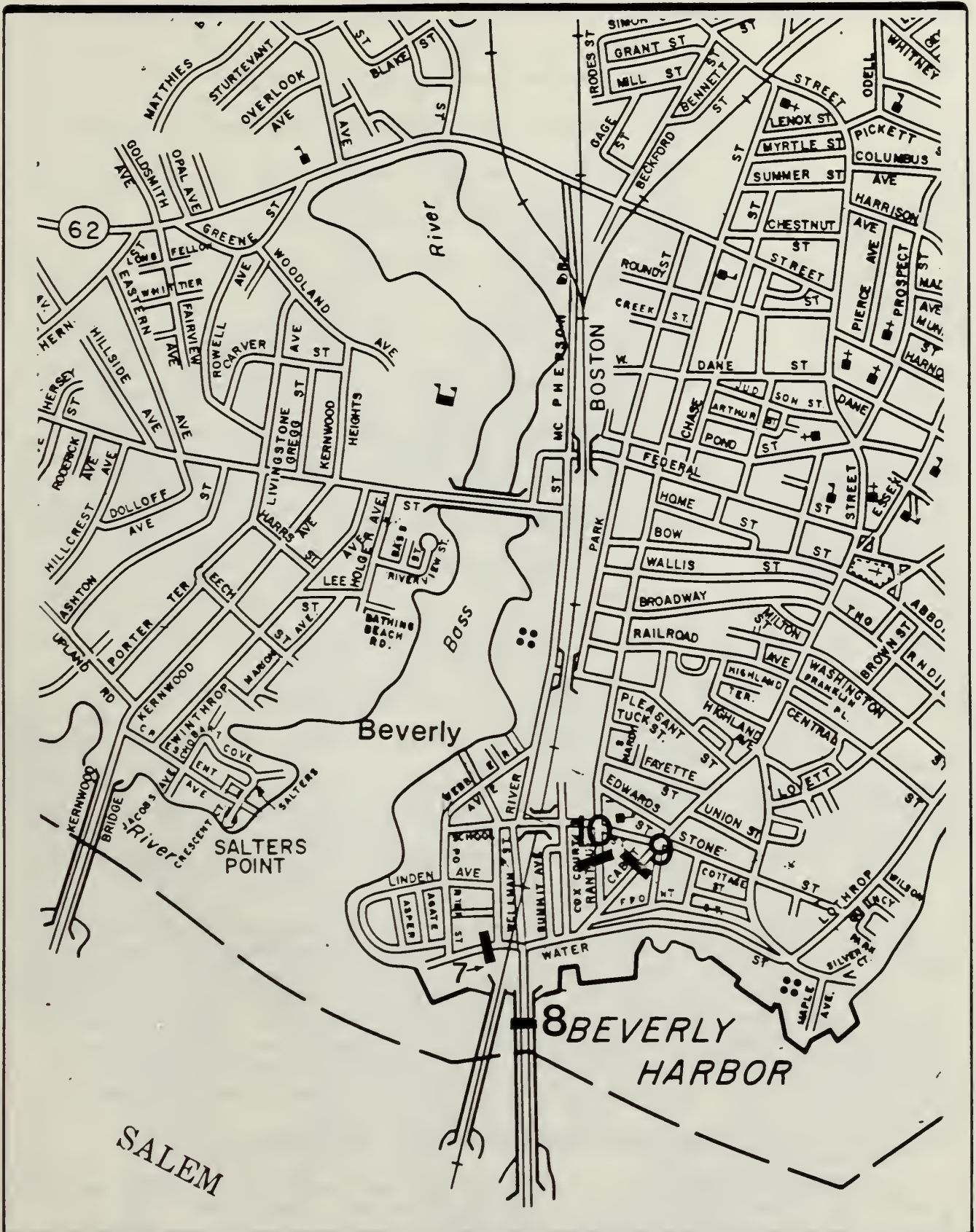
AUTOMATIC TRAFFIC RECORDER COUNT  
LOCATIONS IN SALEM

**CTPS**

**FIGURE**

2-1





Bridge St. Bypass  
in Salem & Beverly



Technical Report 59  
April 1987

AUTOMATIC TRAFFIC RECORDER COUNT  
LOCATIONS IN BEVERLY

**CTPS**  
**FIGURE**

2-2

4. Bridge Street west of Flint Street
5. North Street between Lynde and Essex streets
6. Bridge Street west of Washington Street
- Beverly 7. Water Street east of Porter Street
8. Route 1A at the Salem City Line (on the bridge)
9. Cabot Street south of School Street
10. Rantoul Street south of School Street

The MDPW also took 12-hour manual turning-movement counts in March 1985 at the six locations shown in Figures 2-3 and 2-4. Intersections which presently serve high volumes of traffic and where construction of the bypass could potentially alter current traffic patterns were selected for inclusion:

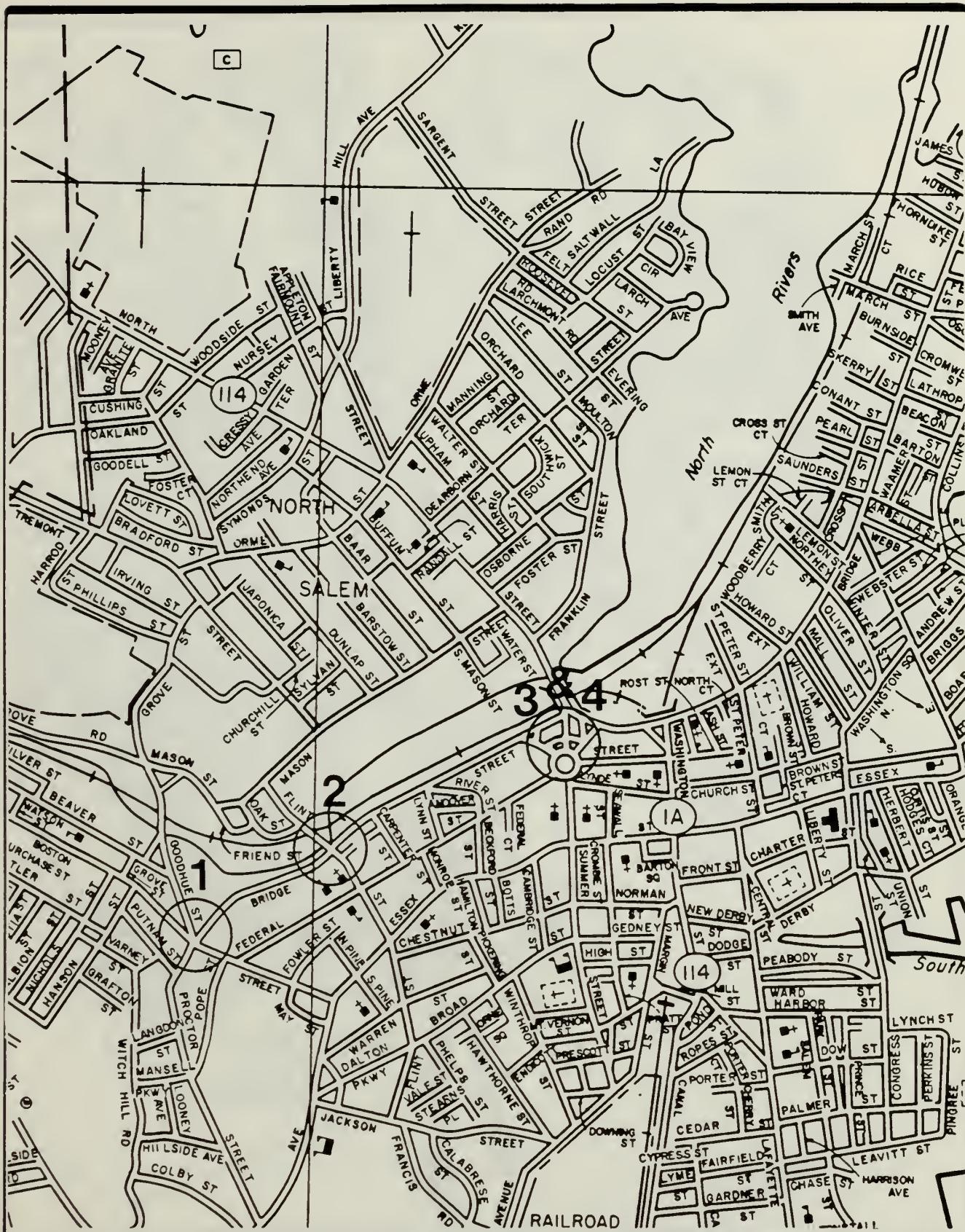
- Salem 1. Bridge Street at Boston, Goodhue, and Proctor streets
2. Bridge Street at Flint Street
3. Bridge Street at North Street
4. North Street at Federal Street and Bridge Street ramps
- Beverly 5. Cabot Street at Water and Rantoul streets
6. Cabot Street at Congress Street and Essex Bridge (Route 1A)

This count data, as reported by the MDPW, was supplemented with data available from the previous work completed in 1978 and 1982. Counts from previous years were adjusted according to historical growth trends developed from MDPW-reported ATR traffic counts taken at area locations in 1978, 1982, and 1985. Because forecasts of AM- and PM-peak-hour conditions were all that were required, AM and PM peak hours were identified and these volumes were factored to reflect areawide traffic growth over the period.

### 2.3 AM- AND PM-PEAK-HOUR TRAFFIC-COUNT BALANCING

As noted above, the traffic data supplied by the MDPW were developed from both manual turning-movement counts and ATR counts. Because the count information was derived from different sources and the count surveys made in the two communities were taken during different weeks, there were minor inconsistencies among the reported volumes from adjacent count stations. Before





Bridge St. Bypass  
in Salem & Beverly



Technical Report 59  
April 1987

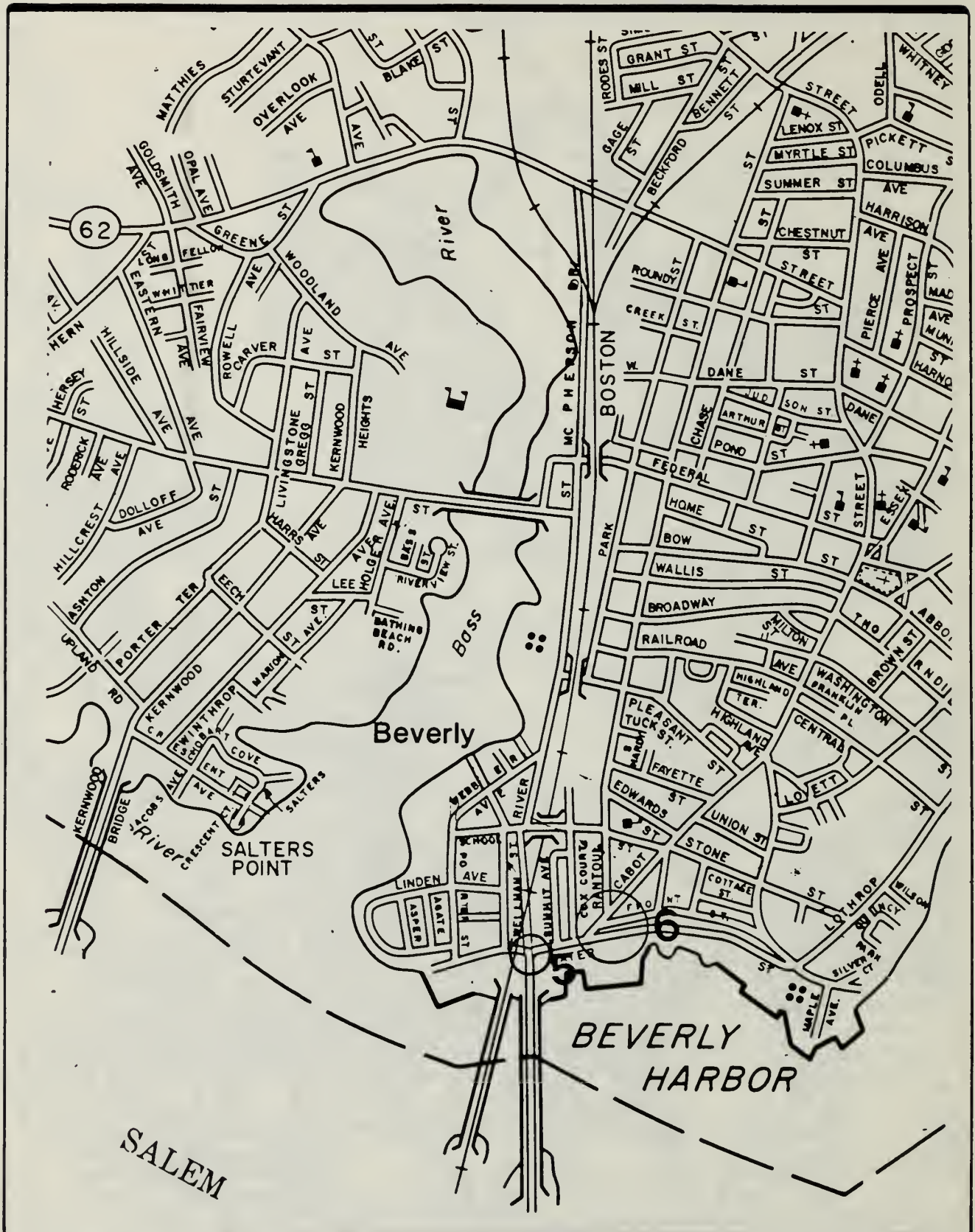
MANUAL TURNING MOVEMENT COUNT  
LOCATIONS IN SALEM

**CTPS**

**FIGURE**

2-3





Bridge St. Bypass  
in Salem & Beverly



Technical Report 59  
April 1987

MANUAL TURNING MOVEMENT COUNT  
LOCATIONS IN BEVERLY

**CTPS**

FIGURE

2-4

the reported data could be used for the intended purpose of calibrating/correcting the synthetic traffic volumes developed from the modeling process, it was necessary to eliminate these inconsistencies through a procedure commonly referred to as traffic-count balancing.

The count-balancing procedure that was used reconciles mathematically the inconsistencies within reported volumes by solving a series of simultaneous equations. All reported count data are assumed to be equally valid and are adjusted to reflect the influence of all related count information. In those instances where the differences in reported link volumes are significant and expected, due to the presence of mid-block features such as parking garages or major shopping facilities, these features are represented as individual traffic zones where traffic can be loaded onto and removed from the highway system.

The "balanced" counts which result from this process are consistent within intersections and between adjacent highway links unless a traffic zone has been connected to the network between a link pair. That is, all intersection turning movements sum to consistent entering and exiting totals, and directional link volumes at end points are equivalent. Where traffic zones are connected to the network, the expected differences in traffic volumes are preserved to the extent that permits balancing on the remainder of the network. The resulting, balanced 1985 AM- and PM-peak-hour traffic volumes finally used in the validation of the 1985 baseline-model output are presented on a schematic diagram of the 1985 network in Appendix A.





---

### 3 TRAVEL-DEMAND FORECASTS

---

#### 3.1 EXISTING TRAVEL-DEMAND CONDITIONS

CTPS developed a table which represented the number of trips between traffic zones in the study area under 1985 no-build conditions. This trip table was developed from a combination of the 1985-forecast trip table produced in 1978 and the 1985 balanced traffic counts. The 1985-forecast trip table was the "seed" table in a trip-table-estimation procedure which adjusted it using observed counts as a constraint.

The procedure for adjusting or updating the seed table was based on a method defined by Van Zuylen and Willumsen in their paper, "The Most Likely Trip Matrix Estimated from Traffic Counts."<sup>1</sup> This method identifies the most probable trip table that reproduces a specified set of traffic counts when assigned to a representative highway network.

The original 1985-forecast table that was used for the calibration of 1985 AM- and PM-peak-hour tables was a 24-hour trip-exchange matrix developed in 1978. Prior to calibration, the 24-hour table was converted into AM- and PM-peak-hour tables by applying the "K" factors also developed in 1978. The resulting AM- and PM-peak-hour tables were then used as seed tables for calibration purposes. The traffic-count data used in calibrating/updating the original, 1985-forecast tables were the directional traffic flows which resulted from the balancing of the turning-movement counts. Directional volumes were used in place of turning-movement volumes because the baseline network was not sufficiently detailed to include turning-movement links. That is, although turning movements were traceable on each of the subsequent networks used, links representing actual turning movements were not coded due to the limited detail of the original network. The calibration of the 1985-forecast table to observed 1985 conditions was, therefore, necessarily dependent on directional vehicle flows.

The resulting AM and PM trip tables were subsequently assigned to the baseline network. The network assignments were then compared to balanced directional count volumes to determine the validity of the model. Where assignment volumes were signif-

---

<sup>1</sup>Transportation Research, Vol. 14B, 1980, p. 281.

icantly different from actual volumes, network adjustments were made and the trip table reassigned. Network adjustments included capacity, speed, and delay changes. Network modifications were successively made until satisfactory comparability existed between modeled and actual volumes.

### 3.2 FUTURE TRAVEL-DEMAND CONDITIONS

Future-year (2005) baseline travel demands were forecast on the basis of existing study-area trip-making characteristics and on foreseeable changes in employment and the number of households in Beverly, Salem, and the surrounding communities. To relate the changes in employment and household parameters to zonal exchanges, the Fratar technique of trip-table adjustment was used. This method involves the development of growth factors for employment and household growth which are simultaneously applied to the zonal totals of a base trip table. The trip table which results from this process is representative of the effects which long-term areawide growth trends are likely to have on future trip-making characteristics.

The growth factors applied were developed from the community-based projections of households and employment through 2005 prepared by the Metropolitan Area Planning Council. Internal-zone growth rates were developed directly from the rates projected for the host community. External-zone rates were developed by identifying communities which might contribute to changes in traffic volumes on the external link connector; these communities' effects were discounted with distance from the study area.

The employment factors for each zone were applied to the base-year trip attractions and the household-formation factors were applied to the base-year trip productions. The resulting attractions were factored to equal the productions, in order to balance the trip matrix. The attraction and production totals were distributed into each of the matrix cells according to the percentage of the total each cell represents. The resulting AM- and PM-peak-hour tables were assigned to the bypass network.

---

## 4 TRAFFIC ASSIGNMENTS

---

### 4.1 BASE YEAR (1985)

As mentioned above, the 1985 AM- and PM-peak-hour trip tables were calibrated to actual conditions on the basis of observed 1985 traffic counts. The calibrated tables were then assigned to the study-area highway network containing the proposed Bridge Street bypass. The assignment results are posted on schematic diagrams of the network in Figures 4-1 and 4-2.

AM-peak-hour and PM-peak-hour vehicle totals on the bypass are projected to be between 900 and 1,100 vehicles per hour. In Salem, most of the traffic exchange between the bypass and existing streets occurs at the North Street (Route 114) bypass interchange. In Beverly, however, there are large exchanges of traffic, which are roughly equivalent, at both the Bridge Street connector and the bypass terminus at Rantoul Street and Cabot Street. Detailed turning movements for the AM- and PM-peak-hour assignments were developed for each of the major intersections affected by the construction of the bypass; summaries of these for each of the peak-hour assignments are in Appendix B.

### 4.2 FUTURE YEAR (2005)

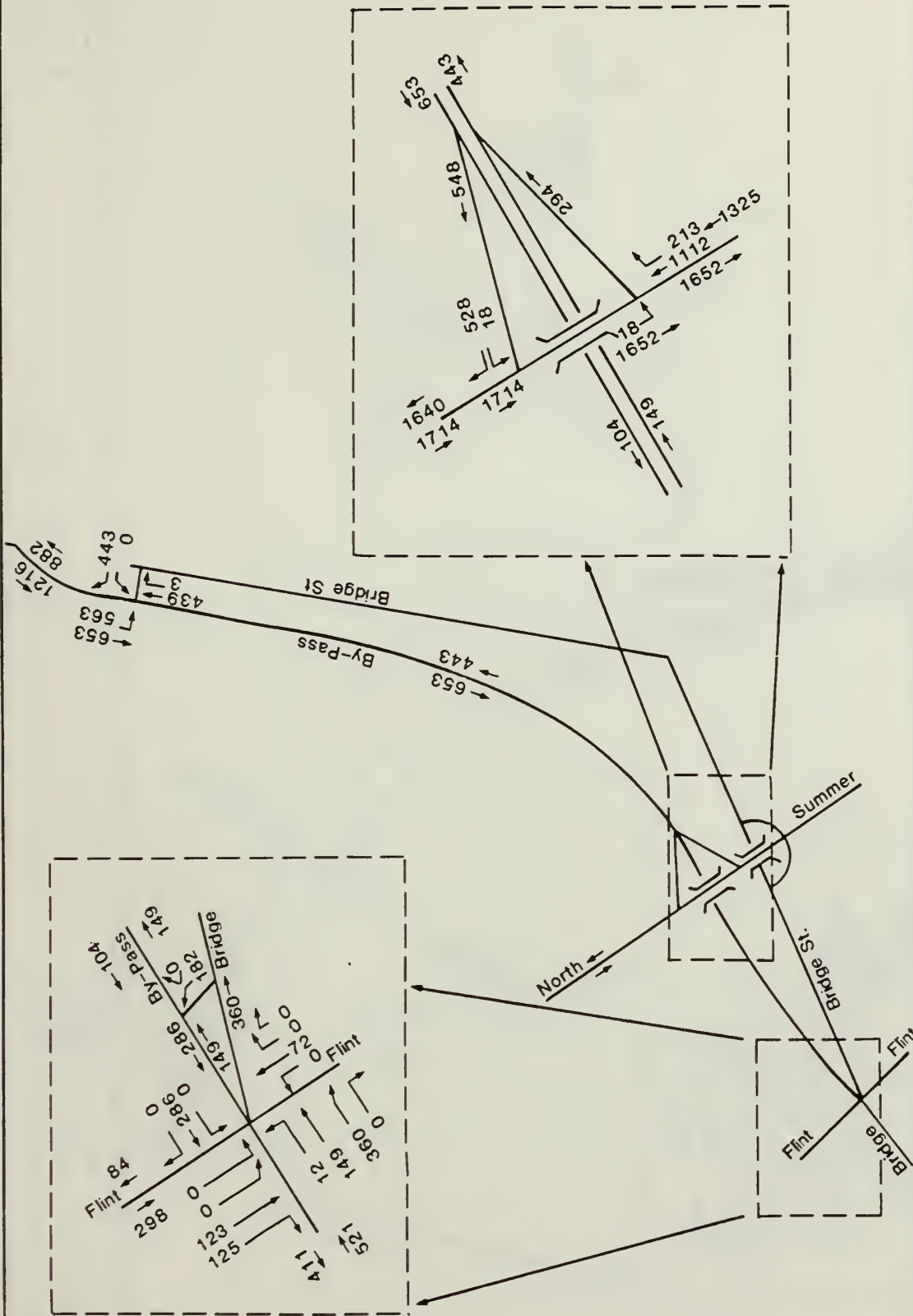
The assignment of the future-year (2005) AM- and PM-peak-hour trip tables to the Bridge Street bypass network is presented in Figures 4-3 and 4-4. Comparison of the base-year to the future-year assignments indicates that traffic volumes will not grow significantly over the 20-year forecast period. PM-peak-hour volumes on the bypass in 2005 are expected to be in the 1985 range of approximately 900 vehicles per hour. AM-peak-hour volumes on the bypass in 2005 are also expected to be in the range of the 1985 assigned volumes, at approximately 1,100 vehicles per hour.

Turning-movement volumes were also plotted, for the 2005 AM- and PM-peak-hour assignments. Summaries of these for each of the major study-area intersections are in Appendix B.

The reason for the relative stability in the volumes projected over the 20-year period is that the Beverly/Salem area is for all practical purposes fully developed. Large-scale redevelopment of the area that would generate significant increases in employment or population is not expected. The anticipated small

increases in traffic volume result primarily from an increase in the total number of households caused by the continuing decline in average household size expected for the future in the study area and the surrounding region.





BASE YEAR (1985)  
AM-PEAK-HOUR FORECAST  
BYPASS NETWORK

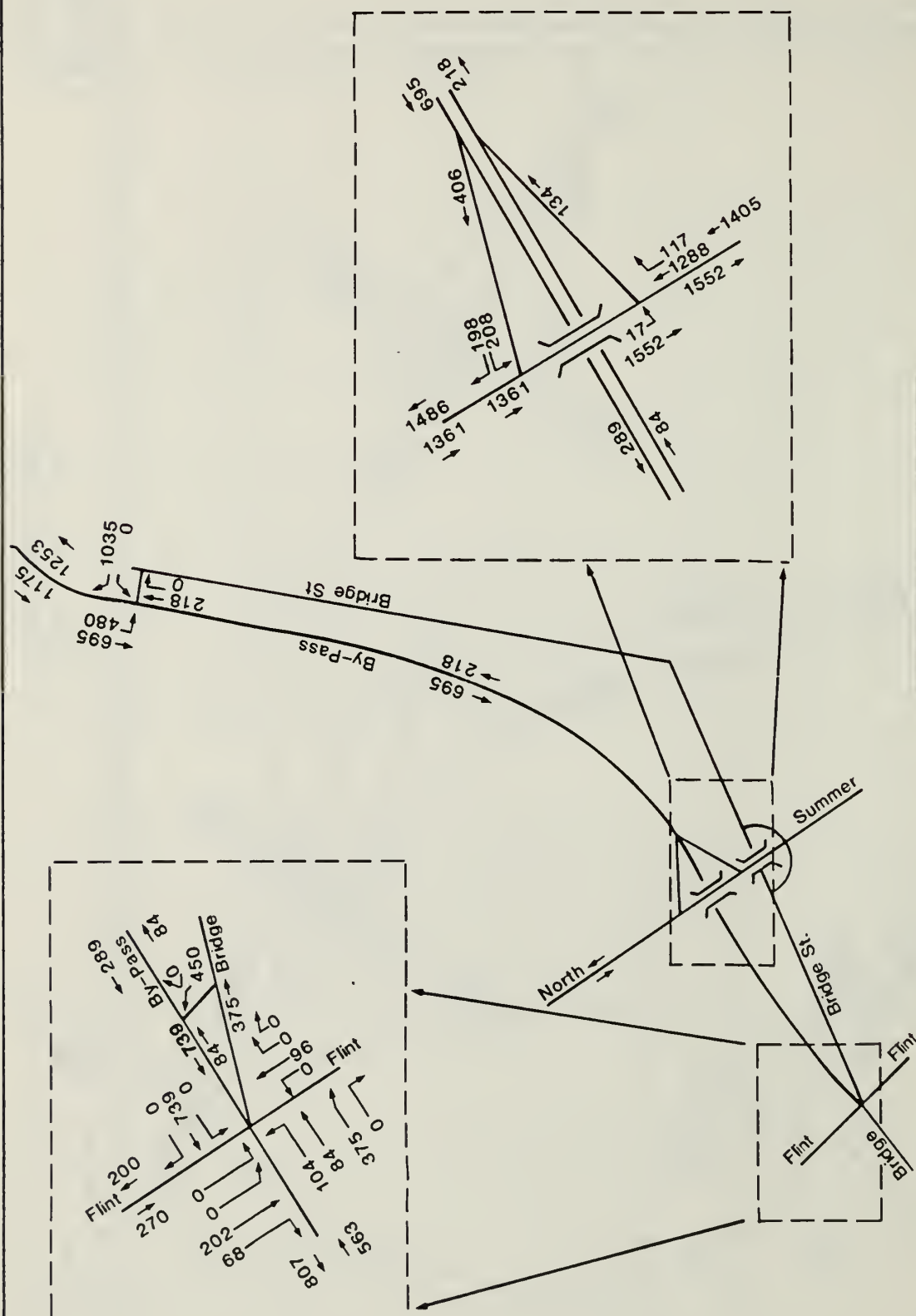


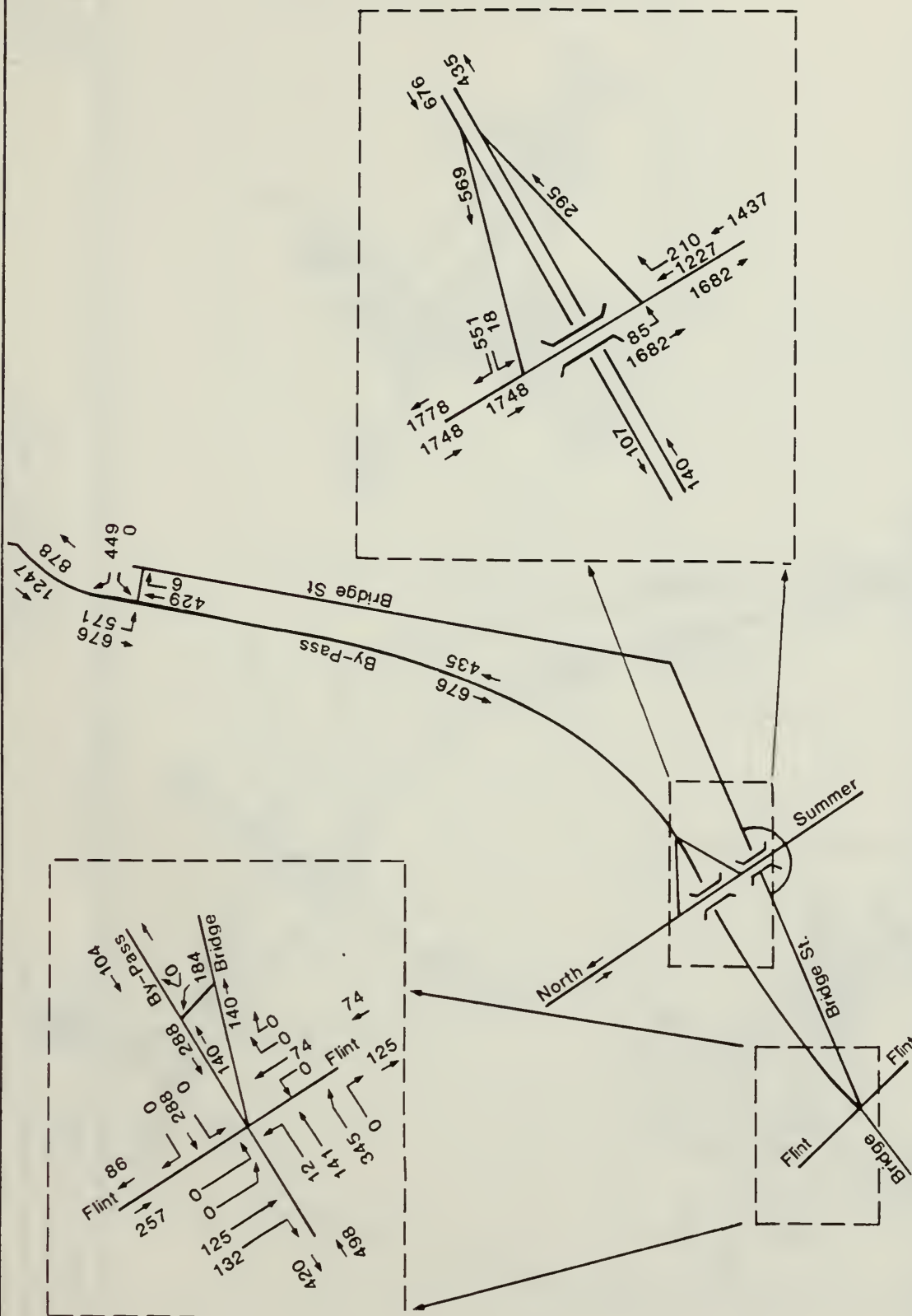
Bridge St. Bypass  
in Salem & Beverly

Technical Report 59  
April 1987

CTPS

FIGURE  
4-1





FUTURE YEAR (2005)  
AM-PEAK-HOUR FORECAST  
BYPASS NETWORK

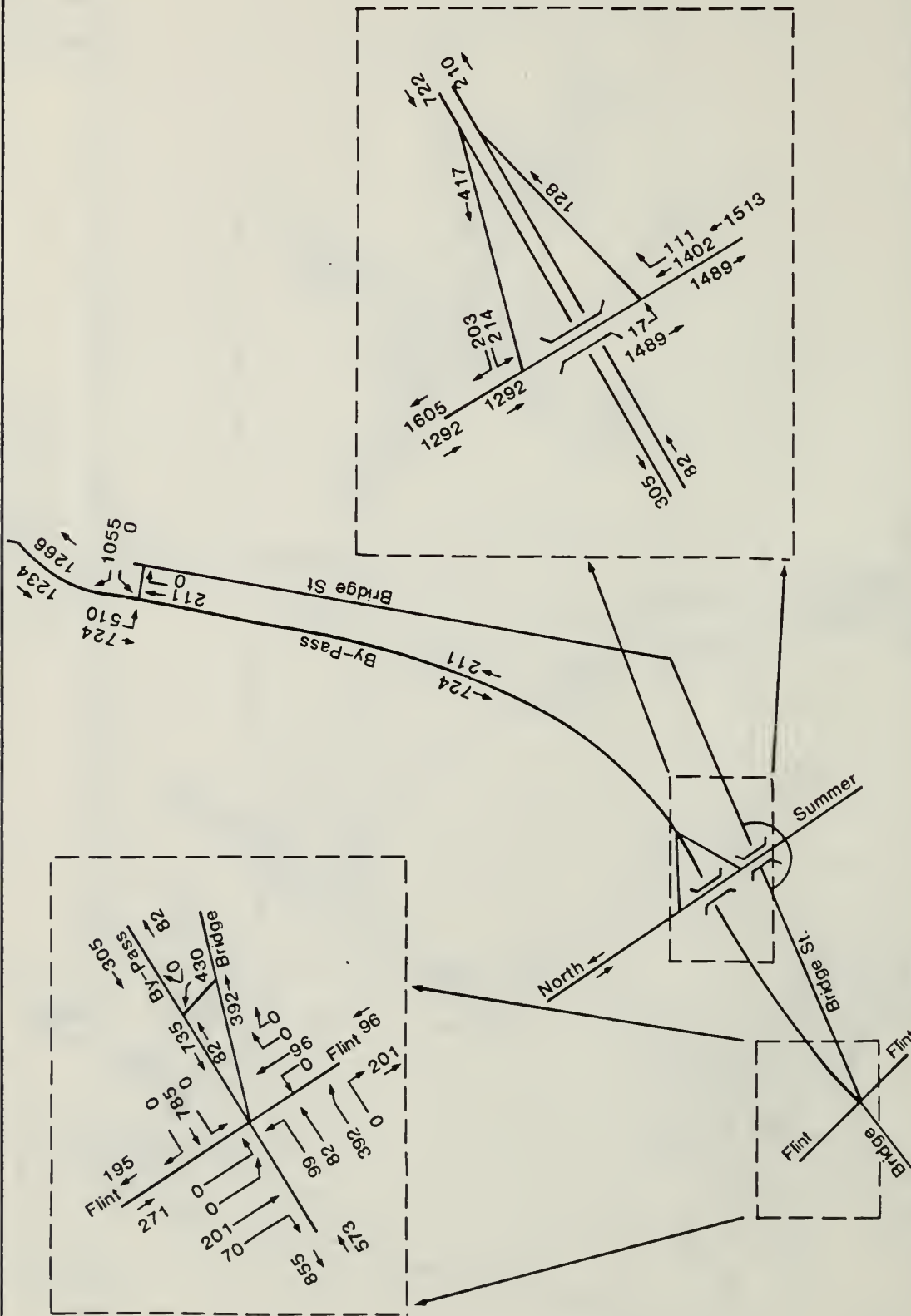


Bridge St. Bypass  
in Salem & Beverly

Technical Report 59  
April 1987

**CTPS**

FIGURE  
4-3



CTPS

FIGURE

4-4

FUTURE YEAR (2005)  
PM-PEAK-HOUR FORECAST  
BYPASS NETWORK



Bridge St. Bypass  
in Salem & Beverly

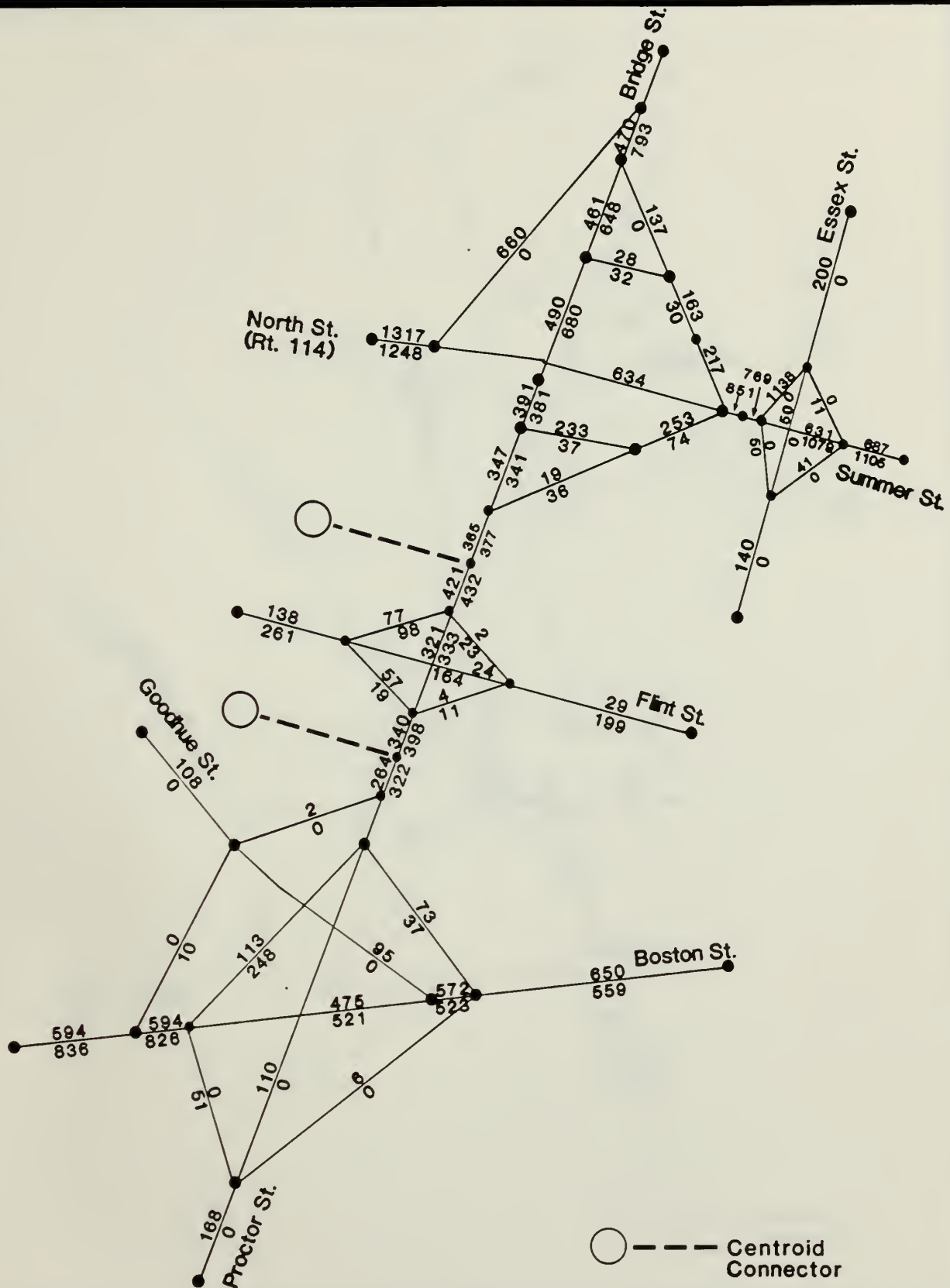
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April 1987

APPENDIX A

1985 AM- and PM-Peak-Hour  
Balanced Volumes  
Used in Calibration







Bridge St. Bypass  
in Salem & Beverly

Technical Report 59  
April 1987

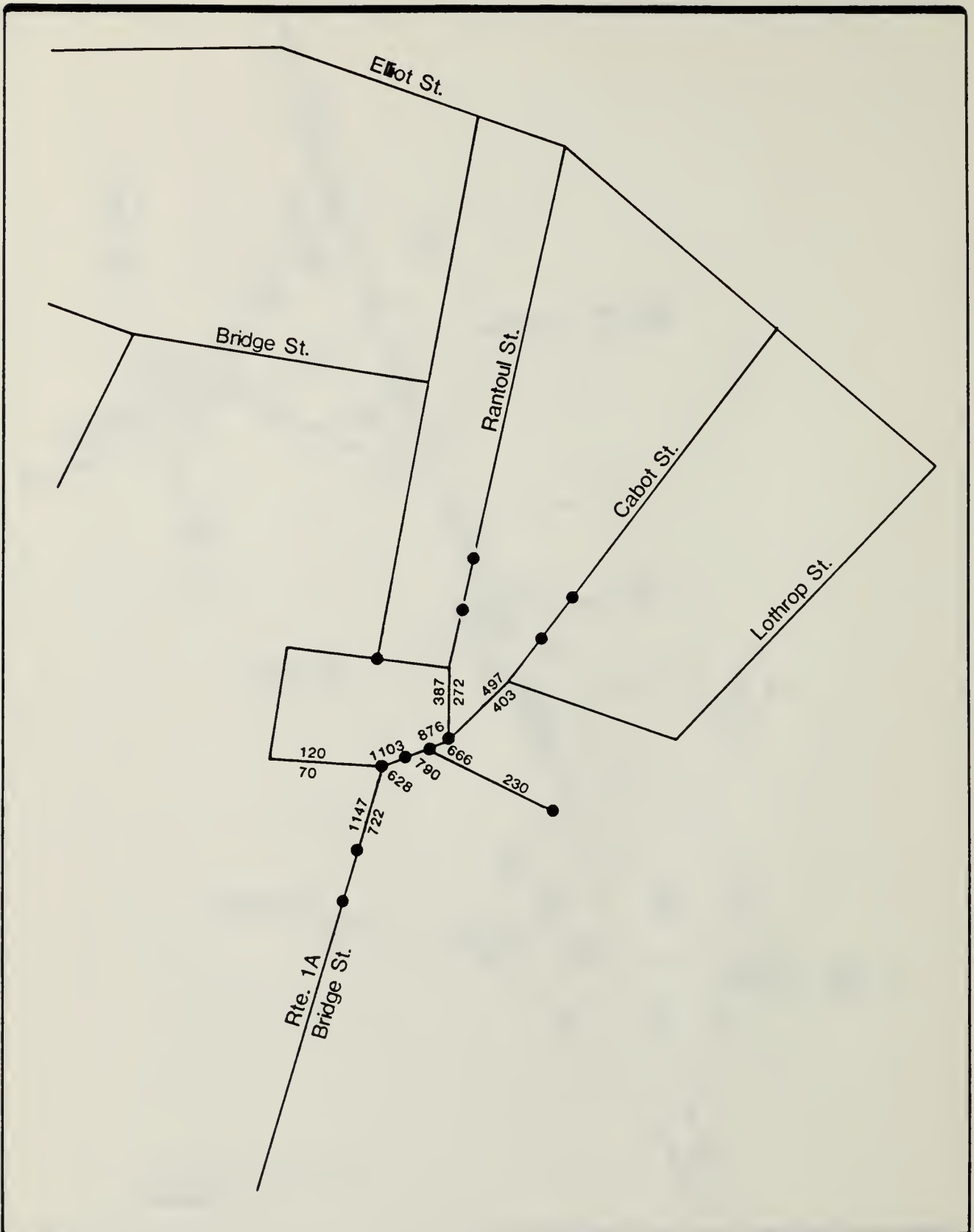
1985  
AM-PEAK-HOUR BALANCED VOLUMES  
SALEM

**CTPS**

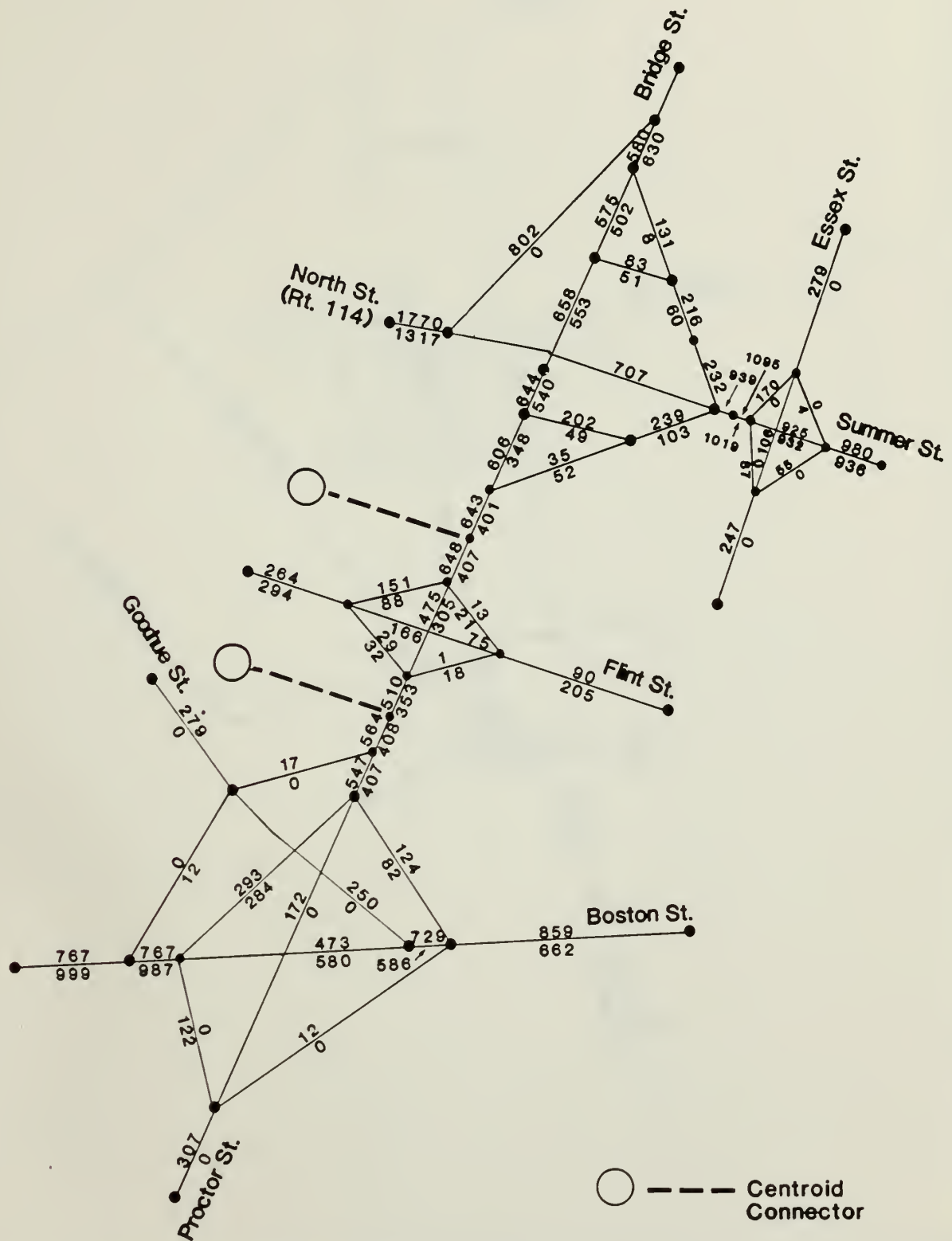
**FIGURE**

A-1





<p>Bridge St. Bypass in Salem &amp; Beverly</p>	<p>1985 AM-PEAK-HOUR BALANCED VOLUMES BEVERLY</p>	<p><b>CTPS</b></p>
<p>Technical Report 59 April 1987</p>		<p><b>FIGURE</b> A-2</p>



Bridge St. Bypass  
in Salem & Beverly

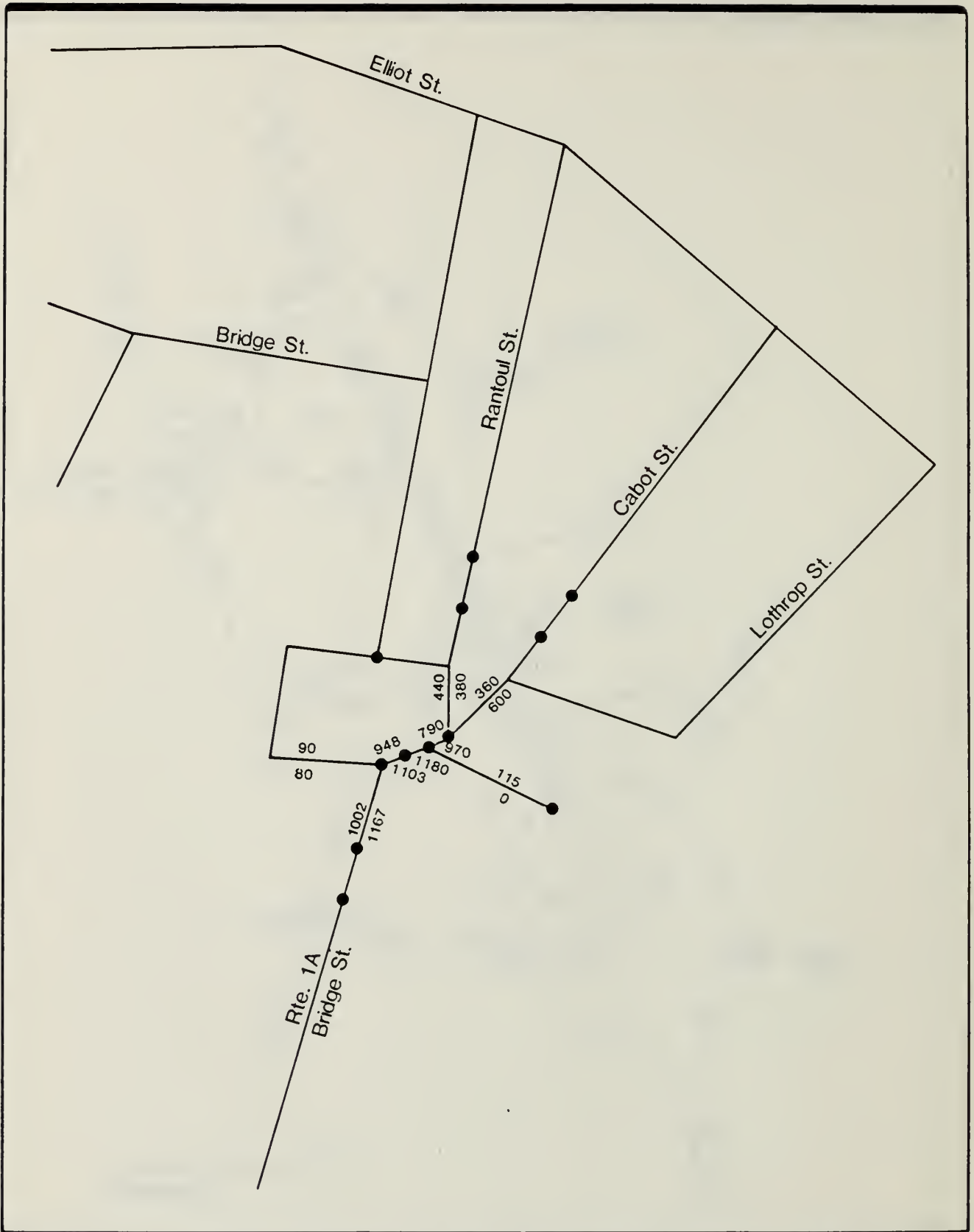
Technical Report 59  
April 1987

1985  
PM-PEAK-HOUR BALANCED VOLUMES  
SALEM

**CTPS**

**FIGURE**

A-3



Bridge St. Bypass  
in Salem & Beverly

Technical Report 59  
April 1987

1985  
PM-PEAK-HOUR BALANCED VOLUMES  
BEVERLY

**CTPS**  
**FIGURE**  
A-4

APPENDIX B

AM- and PM-Peak-Hour  
Turning-Movement Summaries  
by Intersection  
for  
1985 and 2005  
(Bypass Network)



B-1

1985

AM Peak Hour





Node Reference #: 96

Node Reference #: 93

# Traffic Simulation Model Turning Movement Summary

Intersection: Bridge at North St

Year: 1985      Time Period: AM Peak hr      Scenario:      Build By-Pass

[illegible]

```
[ 0] . [102]
      O....
0      O..... 294
      O.....
*****
Name: *          0    1112    213
      *          *
      *          *
      *          *
      *          *
      *          *
      *          * Name: North St
[221]
```

Prepared by:ejb Date: 9/30/85

Node Reference #: 113

# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Bridge at ramp #2

Year: 1985 Time Period: AM Peak hr Scenario: Build By-Pass

[ 0 ]

Name: \* \* \* \* \*

49 55

[ 58 ]

[ 18 ]

762 759 83

Name: Bridge \* \* \* \* \*

507 73

\* Name: ramp #

[ 59 ]

Prepared by: ejb Date: 9/30/85

Node Reference #: 105

Node Reference #: 104

Node Reference #: 108



Node Reference #: 110



Node Reference #: 158

# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: By-Pass off ramp at North St.

Year: 1985 Time Period: AM Peak hr Scenario: Build By-Pass

[103]

Name: North St. \*  
\* 1714 1640 \*  
\* \*  
\* \*  
\* 0 1714 0 \*  
\* . . . \*  
\* . . . \*  
\*\*\*\*\* . \* Name: By-Pass offrp  
\*\*\*\*\* . \*\*\*\*\*  
..... 528  
0 . . . 0 546  
..... 18

[ 0 ]

[233]

0....  
0 0.....  
0.....  
\*\*\*\*\* . \*\*\*\*\*  
Name: \* \*  
\* 0 1112 0 \*  
\* \*  
\* 1732 1112 \*  
\* \*  
\* \* Name: North St

[235]

Prepared by: ejb Date: 9/30/85

Node Reference #: 160

Node Reference #: 162

# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Beverly

Intersection: Bridge at Cabot

Year: 1985 Time Period: AM Peak hr Scenario: Build By-Pass

[ 0 ]

Name: \* \* \* \* \*

\*\*\*\*\*

132

.....

1079

[222]

[223]

0.....

136

136.....

\*\*\*\*\*

Name: Cabot

1215

880

748

.....

1079

748

.....

1079

[230]

Prepared by: ejb Date: 9/30/85

Node Reference #: 154



Node Reference #: 153



B-2

1985

PM Peak Hour



Node Reference #: 96

# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem  
Intersection: Summer at Bridge St.  
Year: 1985 Time Period: PM Peak hr Scenario: Build By-Pass

[221]

Name: ramp \*  
\* 1551 1403 \*  
\* \*  
\* \*  
\* 488 1063 0 \*  
\* . . . \*  
\* . . . \*  
\*\*\*\*\* \* Name: Summer  
\* . . . . 530  
\* . . . .  
488 . . . . 0 530  
\* . . . . 0

[ 60] 0.... [ 59]

322 0..... 133  
322.....

\*\*\*\*\* \*  
Name: Summer \*  
\* 0 873 133 \*  
\* \*  
\* 1385 1006 \*  
\* Name: ramp

[ 72]



Node Reference #: 113





# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Flint at Bridge

Year: 1985 Time Period: PM Peak hr Scenario: Build By-Pass

[132]

Name: Flint \*  
\* 270 200 \*  
\* \*  
\* \*  
\* 68 202 0 \*  
\* . . . \*  
\* . . . \*  
\*\*\*\*\* . . . \*  
\* . . . \*  
\* . . . \*  
\* . . . \*  
809 . . . 741 74

[146]

[22]

104....  
563 459.....  
0.....  
\*\*\*\*\*  
Name: Bridge \*  
\* 0 96 0 \*  
\* \*  
\* 202 96 \*  
\* \*  
\* Name: Flt

[147]

Prepared by: ejb Date: 9/30/85

Node Reference #: 108



Node Reference #: 110



Node Reference #: 158

# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: By-Pass off ramp at North St.

Year: 1985 Time Period: PM Peak hr Scenario: Build By-Pass

[103]

Name: North St. \*  
\* 1359 1482 \*  
\* \*  
\* \*  
\* 0 1359 0 \*  
\* . . . \*  
\* . . . \*  
\*\*\*\*\* . \* Name: By-Pass offrp  
\*\*\*\*\*  
..... 194  
0 . . . 0 402

[ 0]

[233]

0....  
0 0.....  
0.....  
\*\*\*\*\*  
Name: \*  
\* \*  
\* 0 1288 0 \*  
\* \*  
\* 1567 1288 \*  
\* \*  
\* Name: North St.

[235]

Prepared by: ejb Date: 9/30/85

Node Reference #: 160







Node Reference #: 153



B-3

2005

AM Peak Hour





# Traffic Simulation Model Turning Movement Summary

Year: 2005 Time Period: AM PK HR Scenario: BUILD

```
[ 72 ]
```

Name:	Summer *			*
	* 1154			* 939
	* * * *			* * * *
	* 251 903 0			* * * *
	* . . .			* * * *
	* . . .			* * * *
*****	* . . .			* * Name: Federal
	. . .			* *****
	.	.	.	.... 164
	.	.	.	
263	.	.	.	..... 12 176

```
[ 80] .
      .
    O....
      .
      .
O       O.....
      .
      .
      .
      .
      .
      .
*****
Name:   Federal *
      *
      *
      *
      *
      *
      *
          903
[ 71]
```

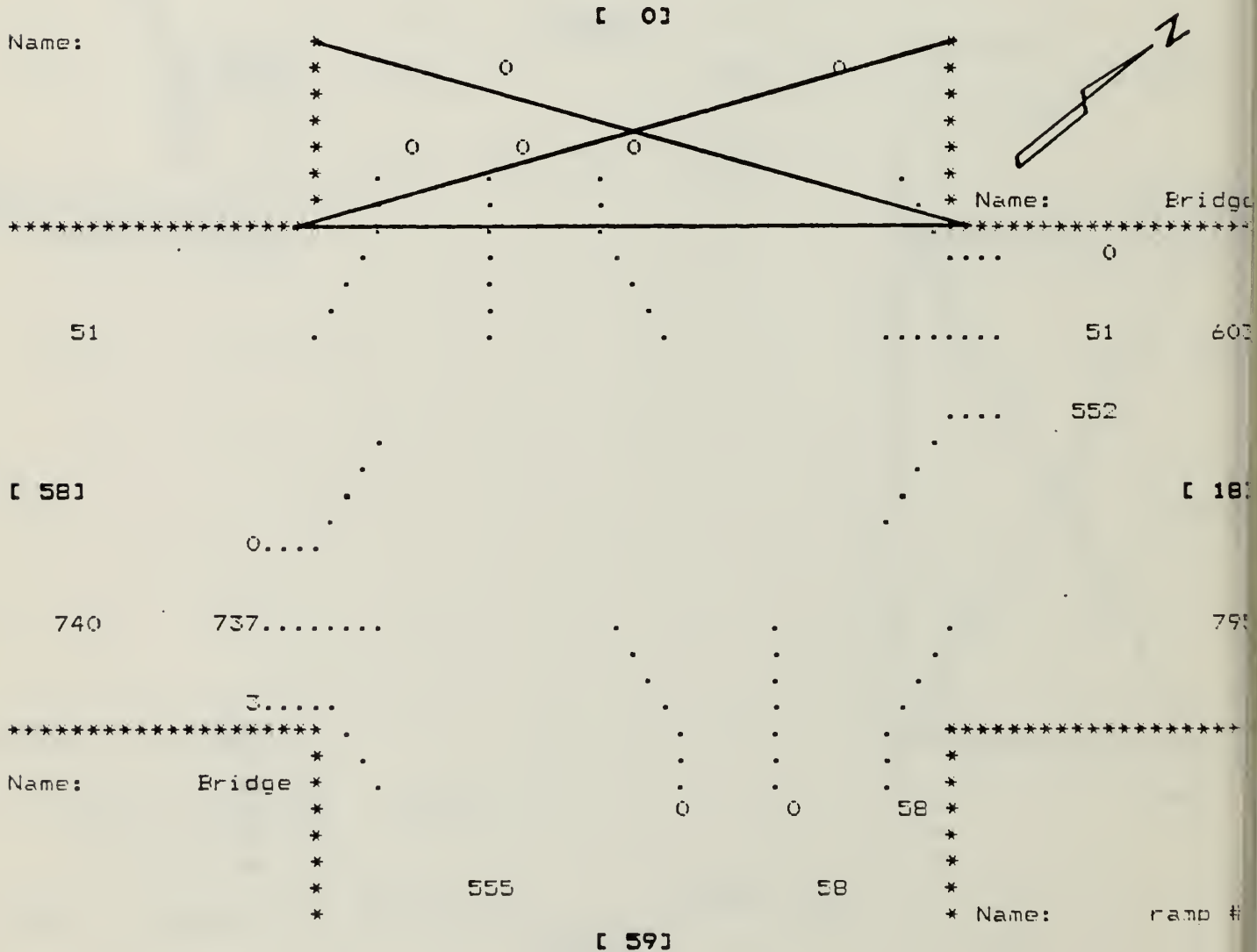




# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

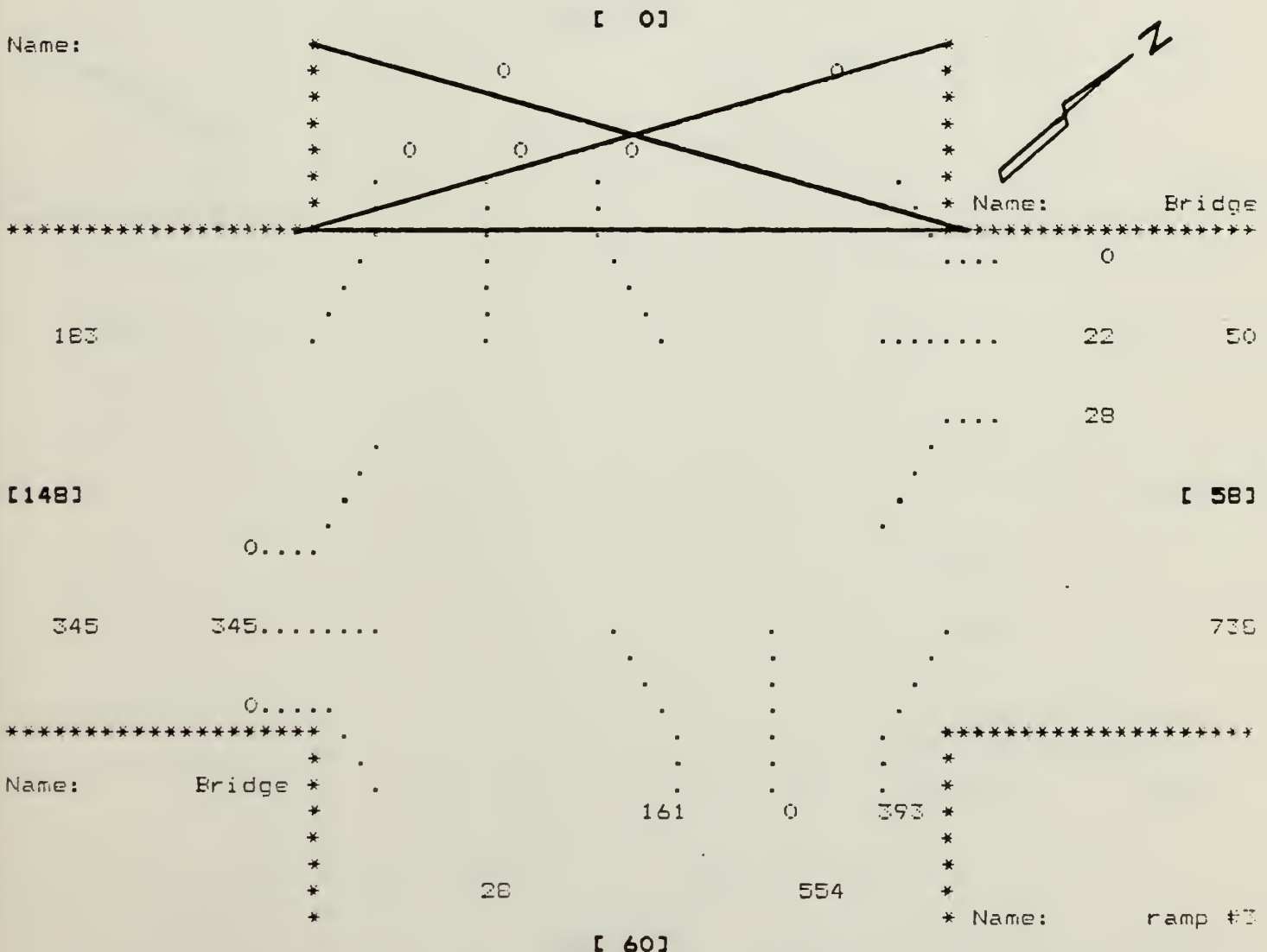
Community: Salem  
Intersection: Bridge at ramp #2  
Year: 2005 Time Period: AM PK HR Scenario: BUILD



# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem  
Intersection: Bridge at ramp #3  
Year: 2005 Time Period: AM PK HR Scenario: BUILD





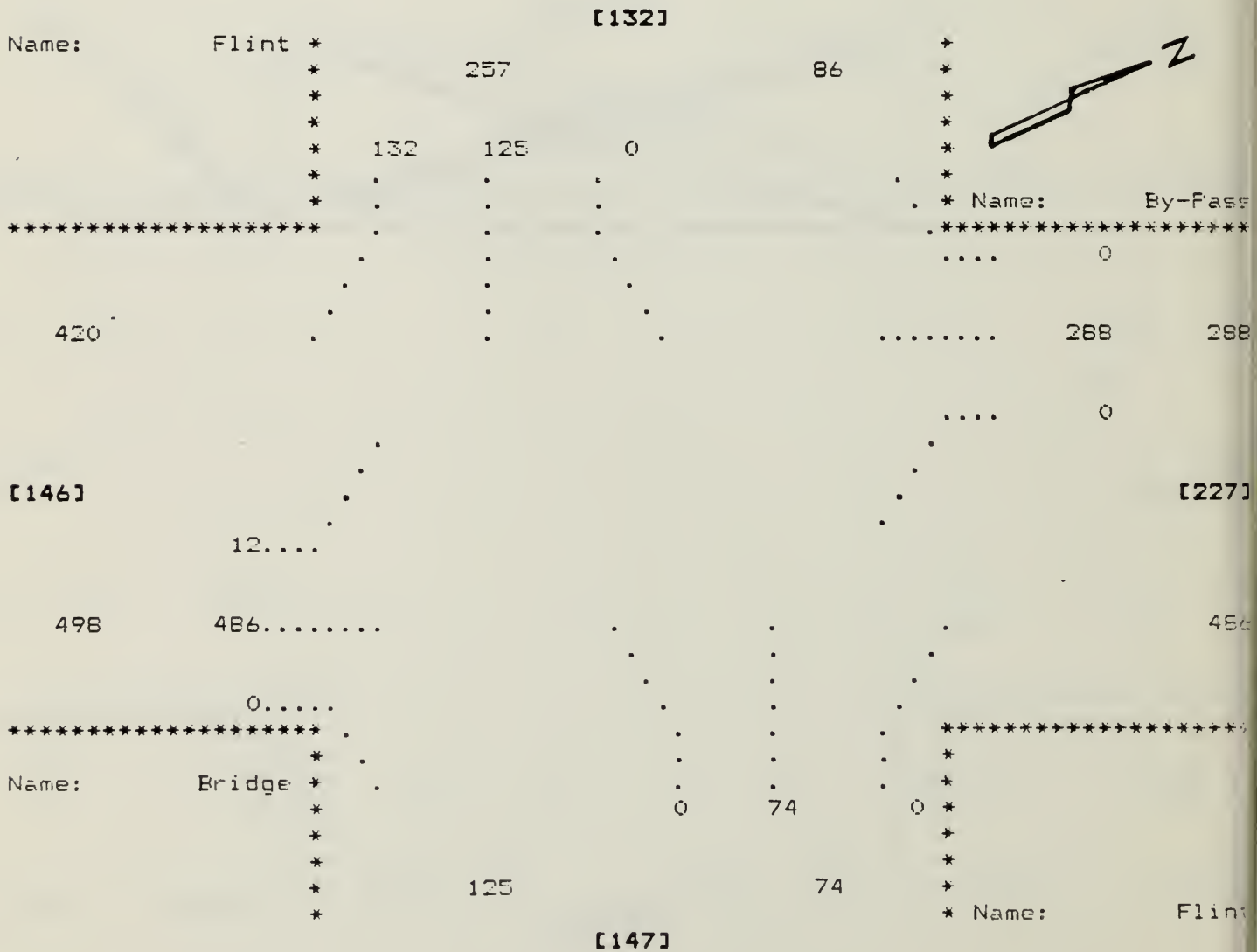
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Flint at Bridge

Year: 2005 Time Period: AM PK HR Scenario: BUILD



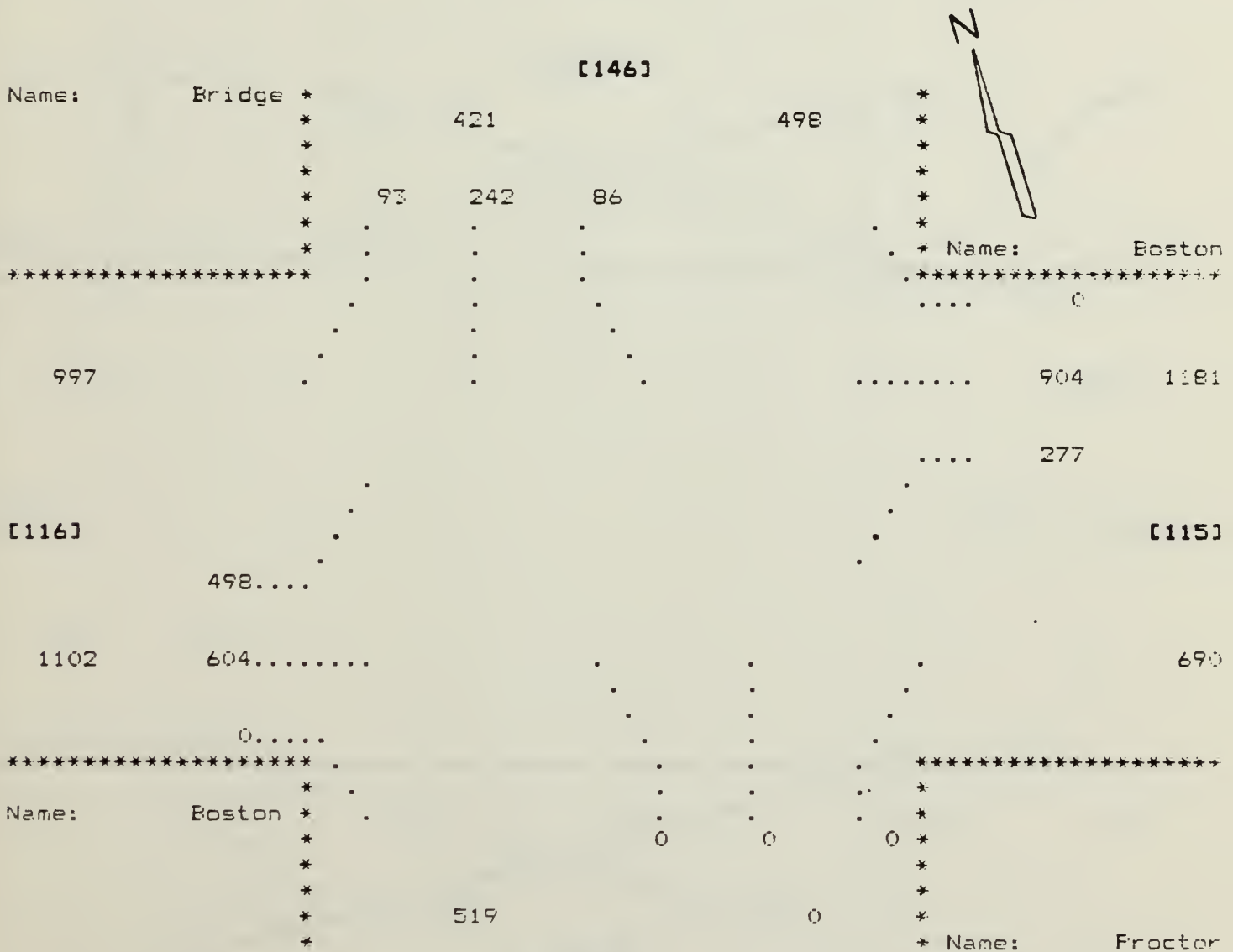
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Proctor at Boston\*

Year: 2005 Time Period: AM PK HR Scenario: EUILI



[152]

\* The Boston St, Bridge St, Gordine St. and Proctor St intersection was split into Boston St. at Gordine St. and Boston St at Bridge St. and Proctor St.



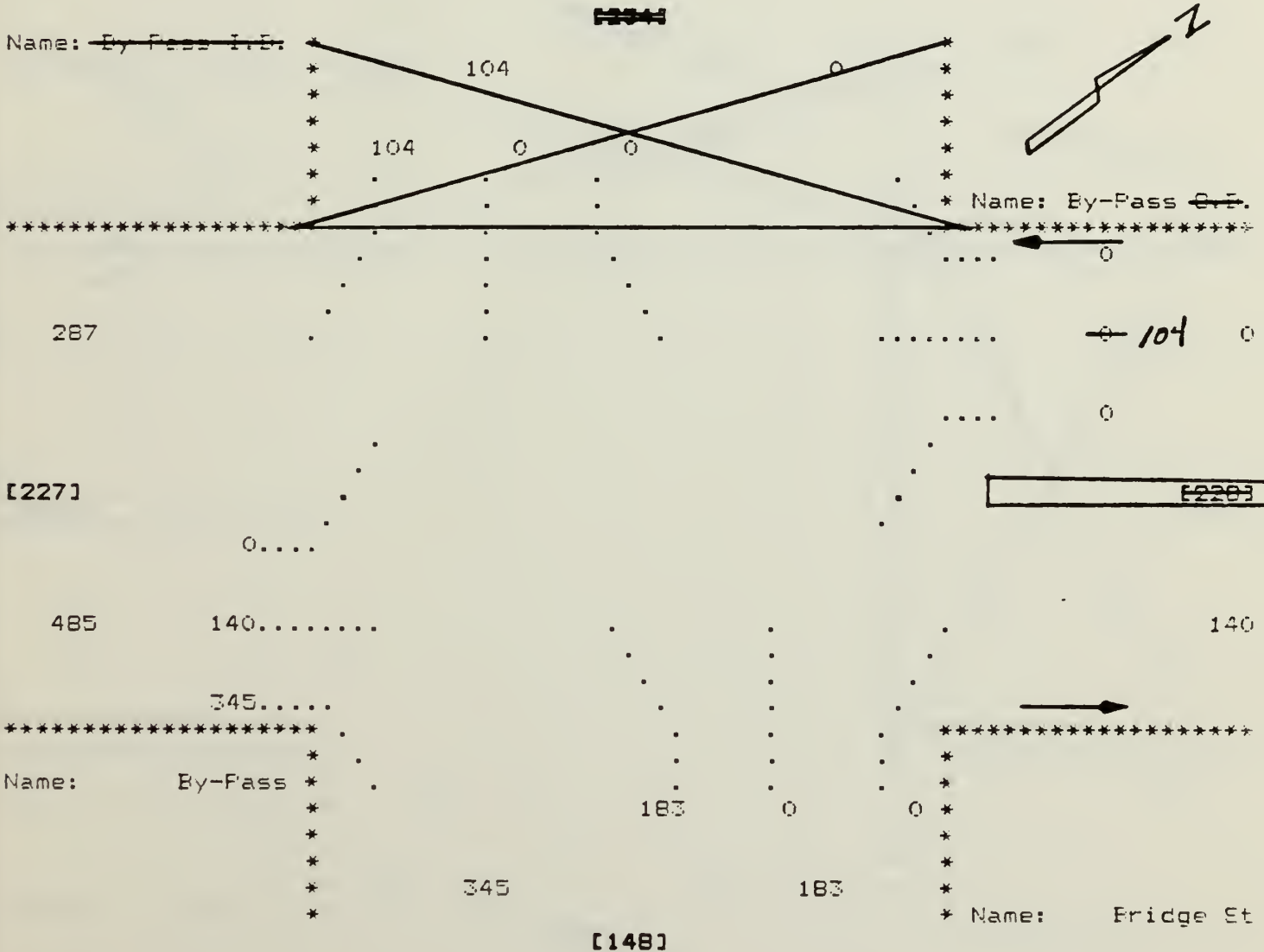
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Bridge at Bridge St. By-Pass

Year: 2005 Time Period: AM PK HR Scenario: BUILD



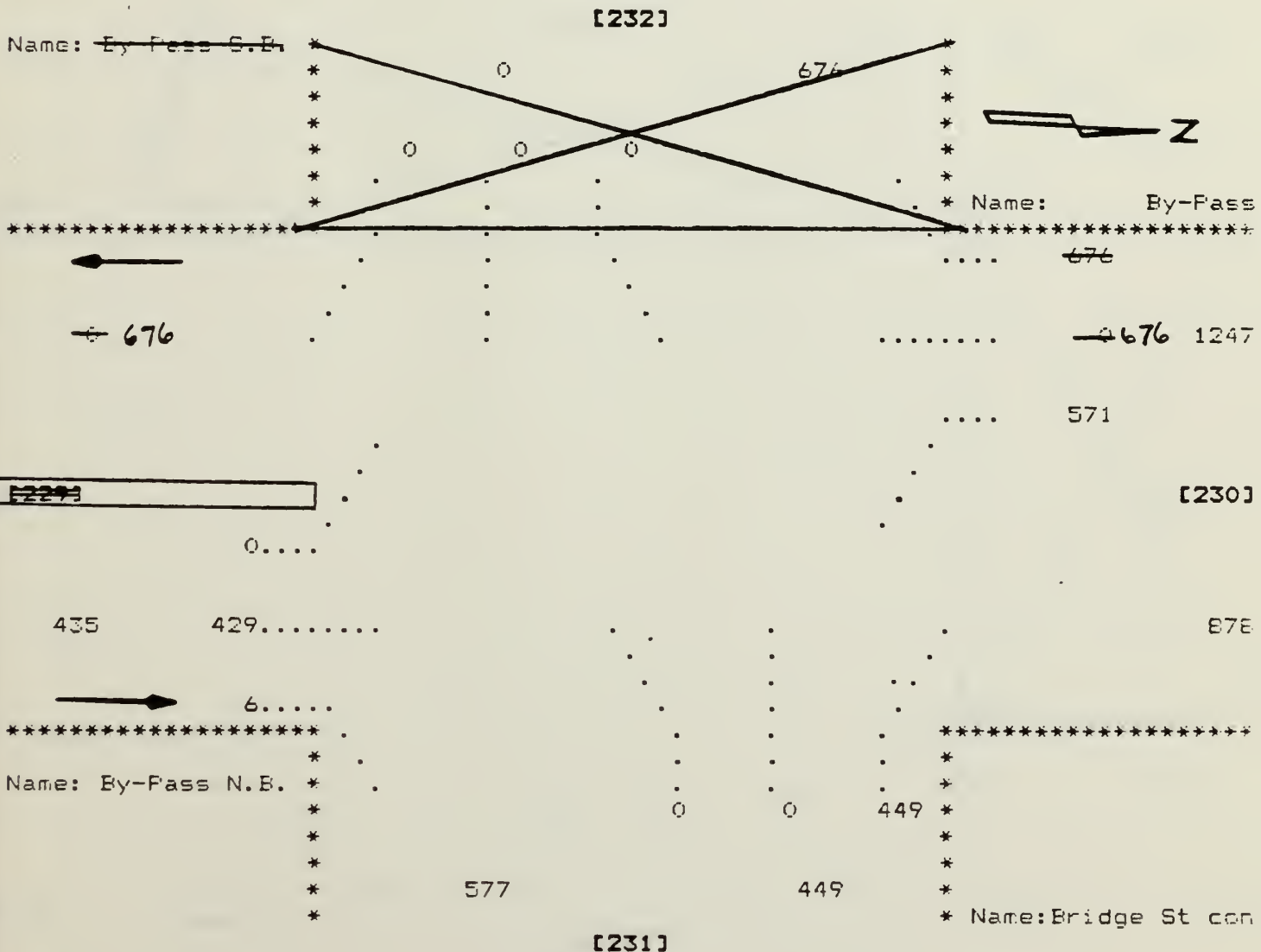




# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Beverly  
Intersection: By-Pass at Bridge St.  
Year: 2005 Time Period: AM PK HR Scenario: BUILD



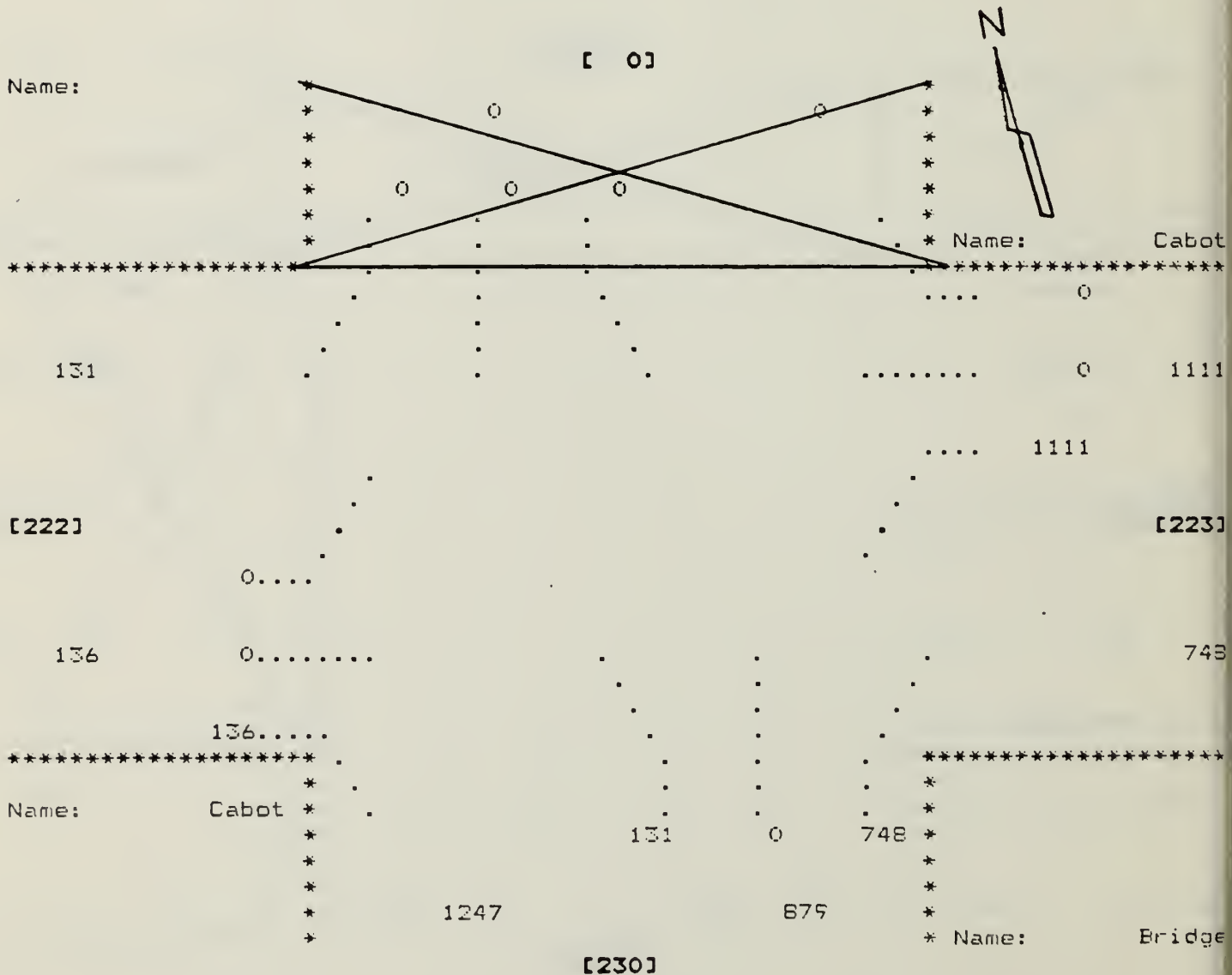
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Beverly

Intersection: Bridge at Cabot

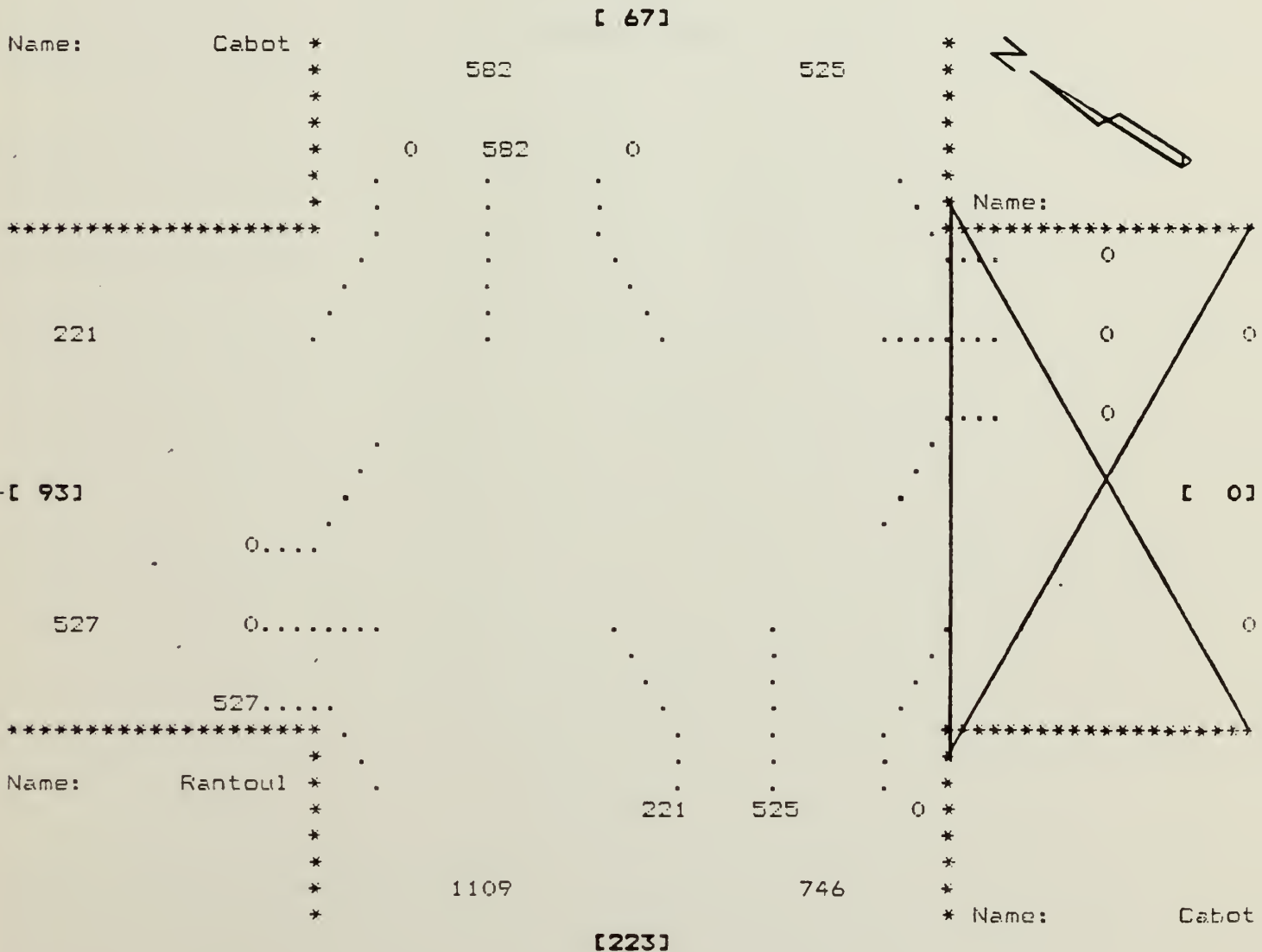
Year: 2005 Time Period: AM PM HR Scenario: BUILD



# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Beverly  
Intersection: Cabot at Rantoul  
Year: 2005 Time Period: AM PK HR Scenario: BUILD





B-4

2005

PM Peak Hour





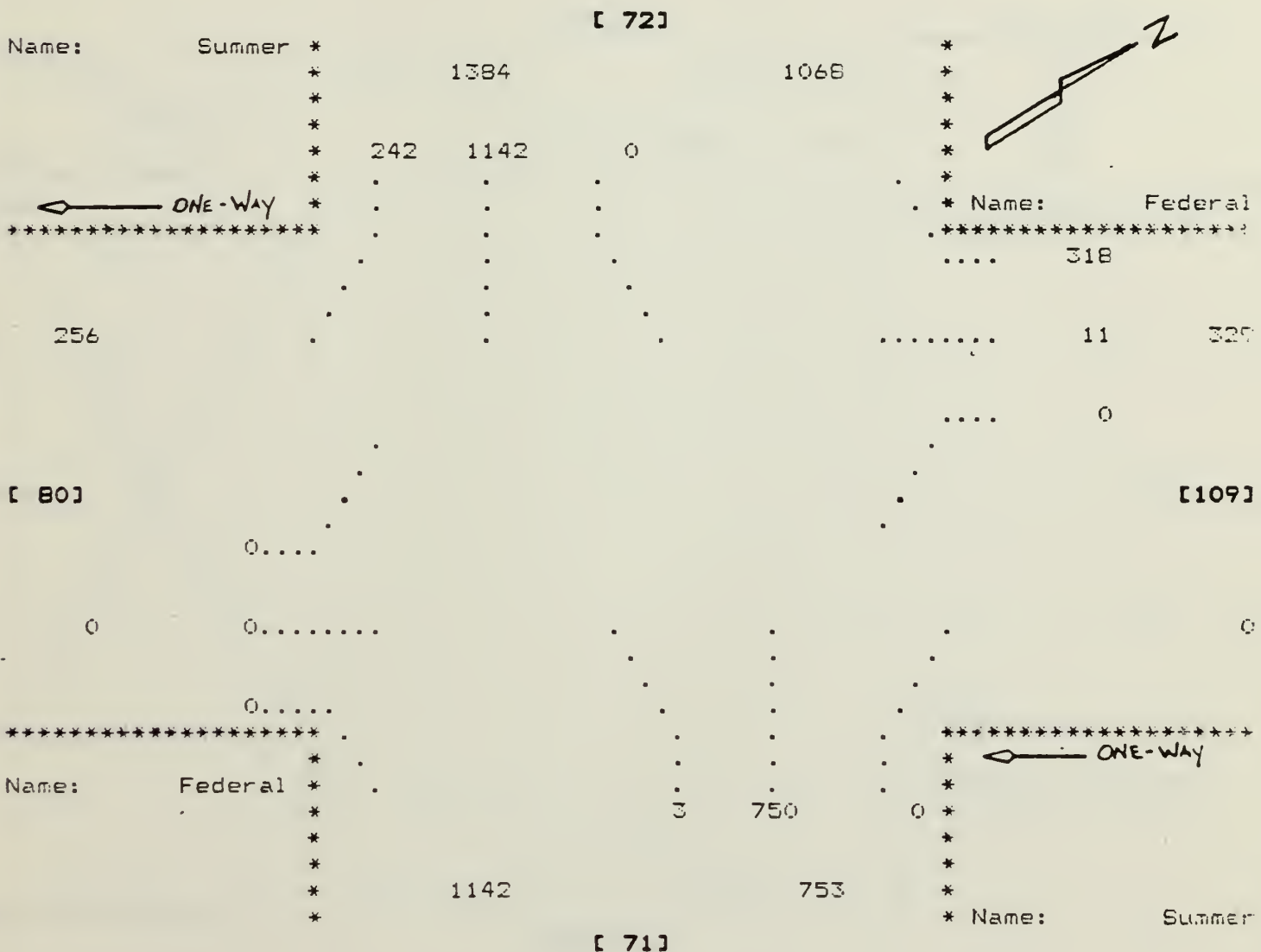
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Federal at Summer

Year: 2005 Time Period: PM PK HR Scenario: BUILD



Prepared by: EJB Date: 10-11-1985

Node Reference #: 96

# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

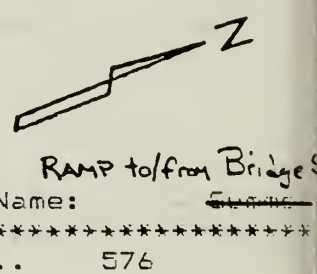
Community: Salem

Intersection: Summer at Bridge St.

Year: 2005 Time Period: PM PK HR Scenario: BUILD

Name: North St. ramp [221]

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Name: RAMP Summer	.	.	*
to/from Bridge St.	.	.	*
*	0	936	129
*			*
*			*
*	1385	1065	*
*			*

[ 72]

Name: North St. ramp

Prepared by: EJB Date: 10-11-1985

Node Reference #: 93

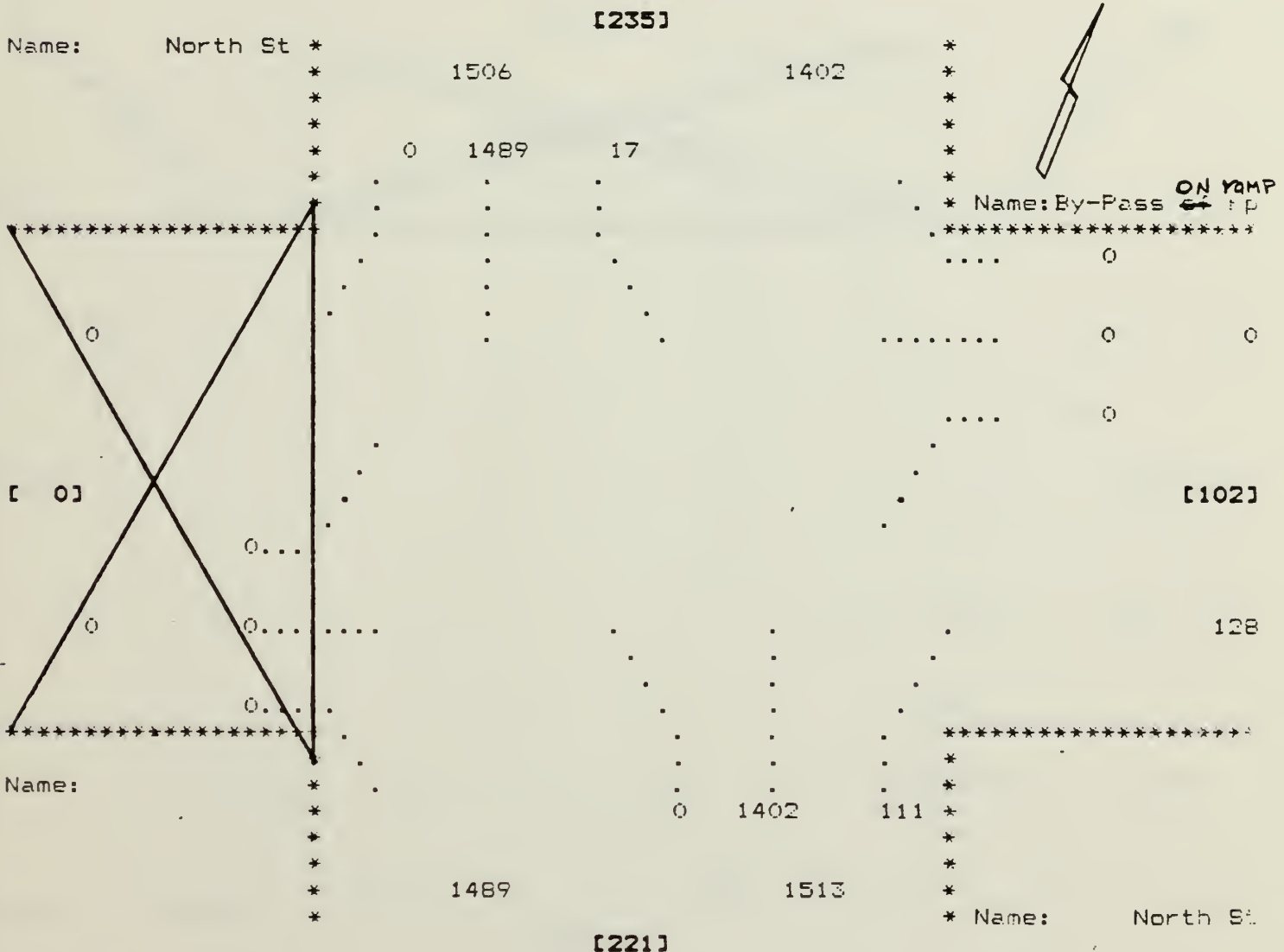
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Bridge at North St

Year: 2005 Time Period: PM PK HR Scenario: BUILD



Prepared by: EJB Date: 10-11-1985

Node Reference #: 113

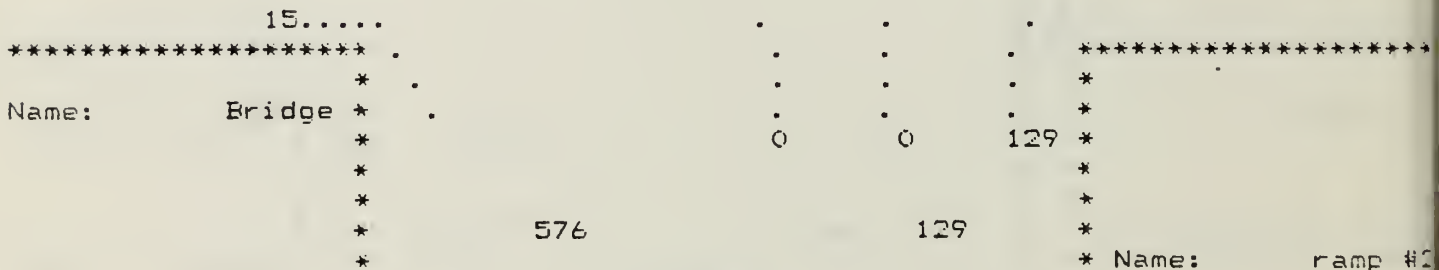
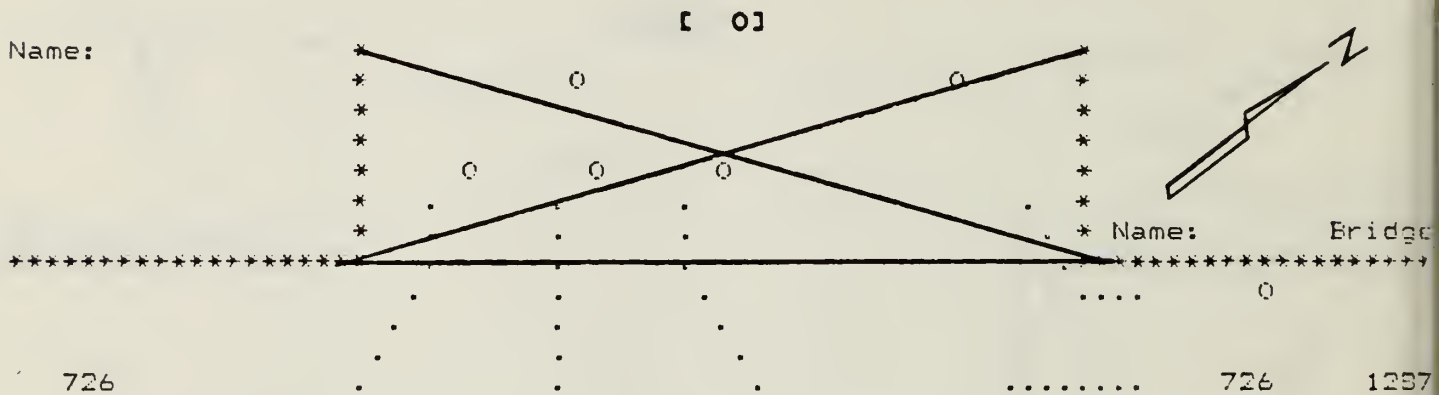
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersections: Bridge at ramp #2

Year: 2005 Time Period: PM PK HR Scenario: BUILD



[ 59 ]

Prepared by: EJB Date: 10-11-1985

Node Reference #: 105

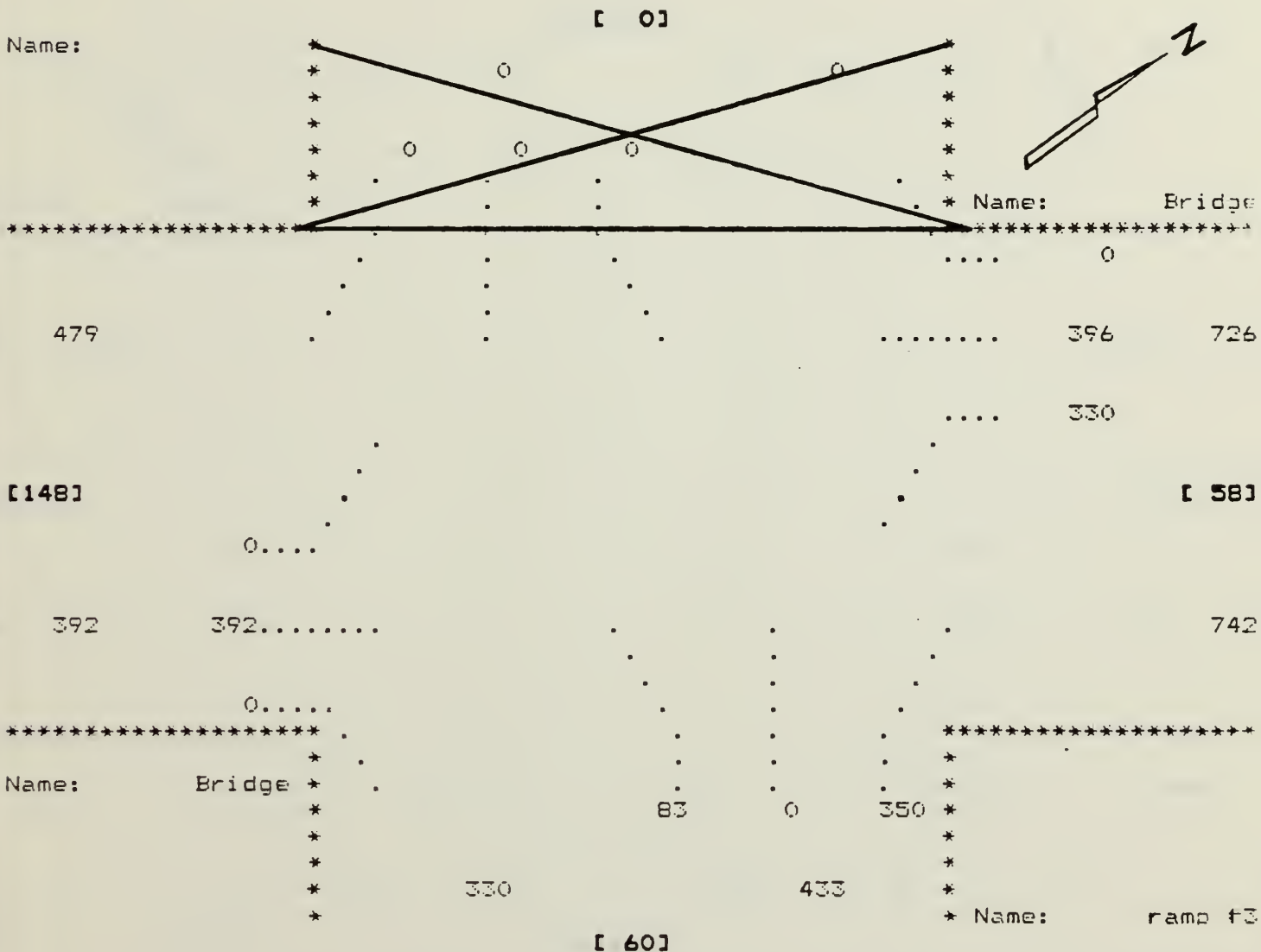
Central Transportation  
Planning Staff

Traffic Simulation Model  
Turning Movement  
Summary

Community: Salem

Intersection: Bridge at ramp #3

Year: 2005 Time Period: PM PK HR Scenario: BUILD



Prepared by: EJB Date: 10-11-1985

Node Reference #: 104



# Traffic Simulation Model Turning Movement Summary

Year: 2005      Time Period:      PM PK HR      Scenario:      BUILD

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[146]                               [227]
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Name:    Bridge * .
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201             96
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```
* Name:          Flint
```

Node Reference #: 108

# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Proctor at Boston\*

Year: 2005 Time Period: PM PK HR Scenario: BUILD

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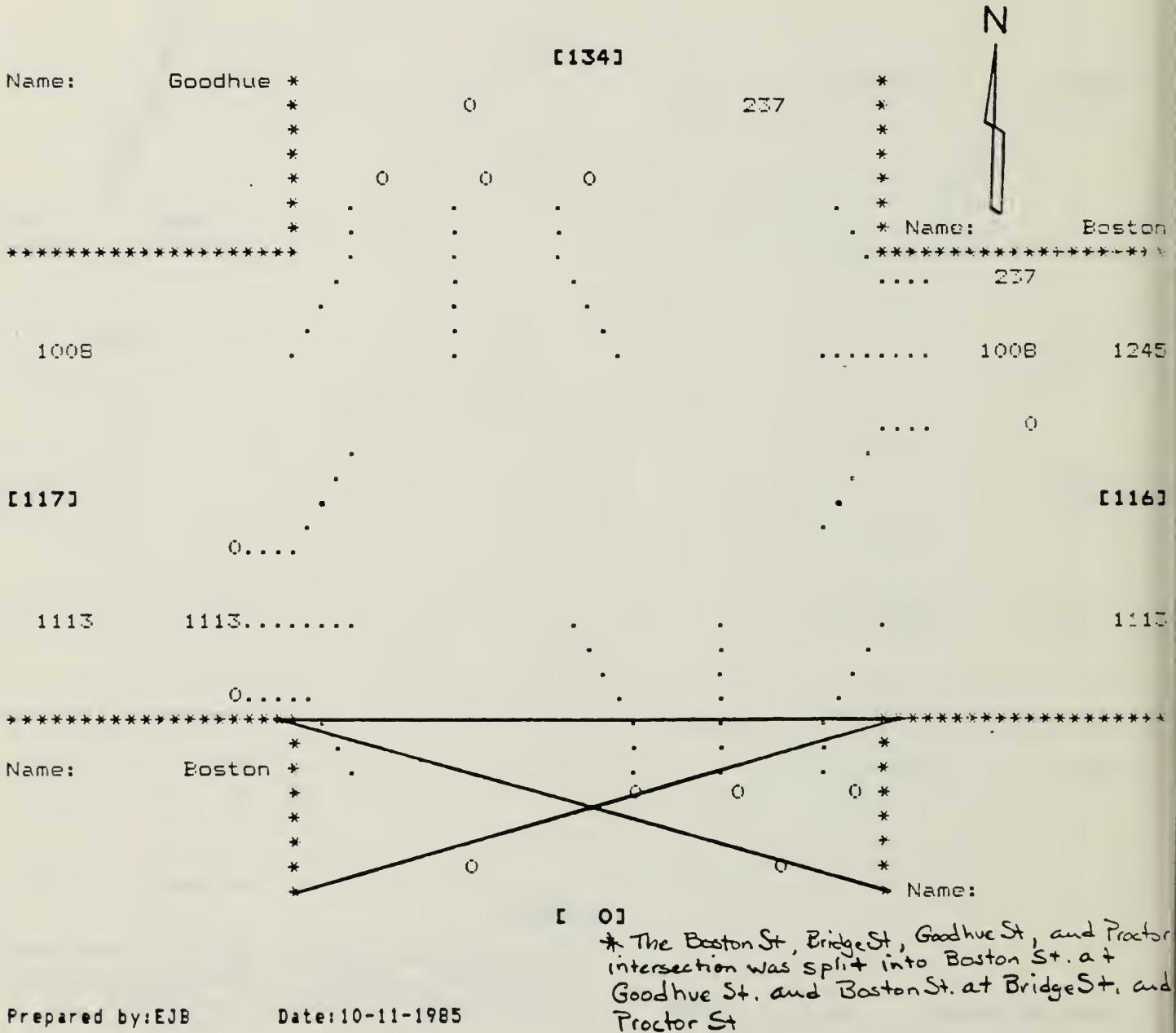
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: Boston at Goodhue \*

Year: 2005 Time Period: FM PK HR Scenario: BUILD



Prepared by: EJB Date: 10-11-1985

Node Reference #: 109

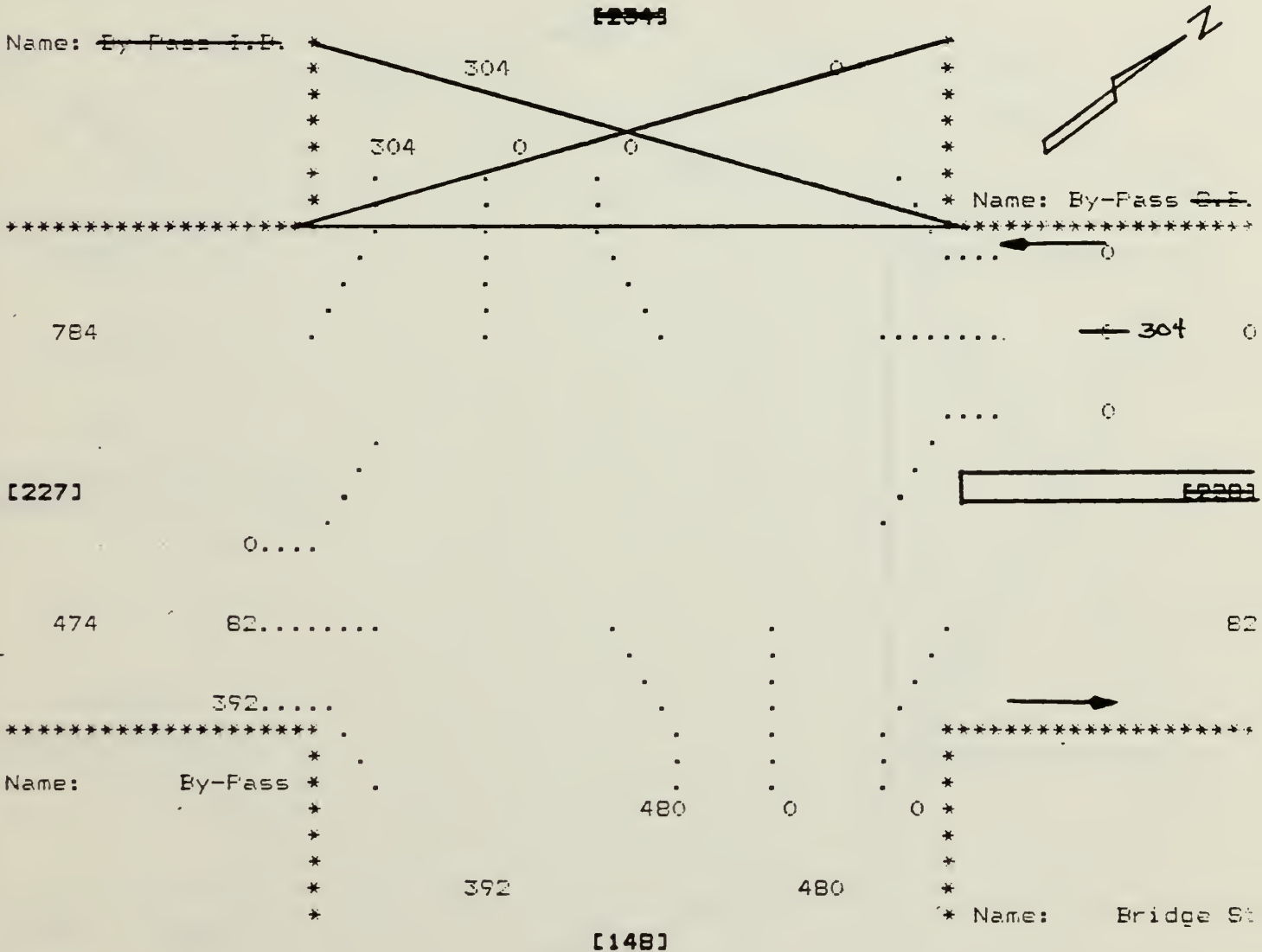
Central Transportation  
Planning Staff

Traffic Simulation Model  
Turning Movement  
Summary

Community: Salem

Intersection: Bridge at Bridge St. By-Pass

Year: 2005 Time Period: PM PK HR Scenario: BUILD



Prepared by: EJB Date: 10-11-1985

Node Reference #: 158

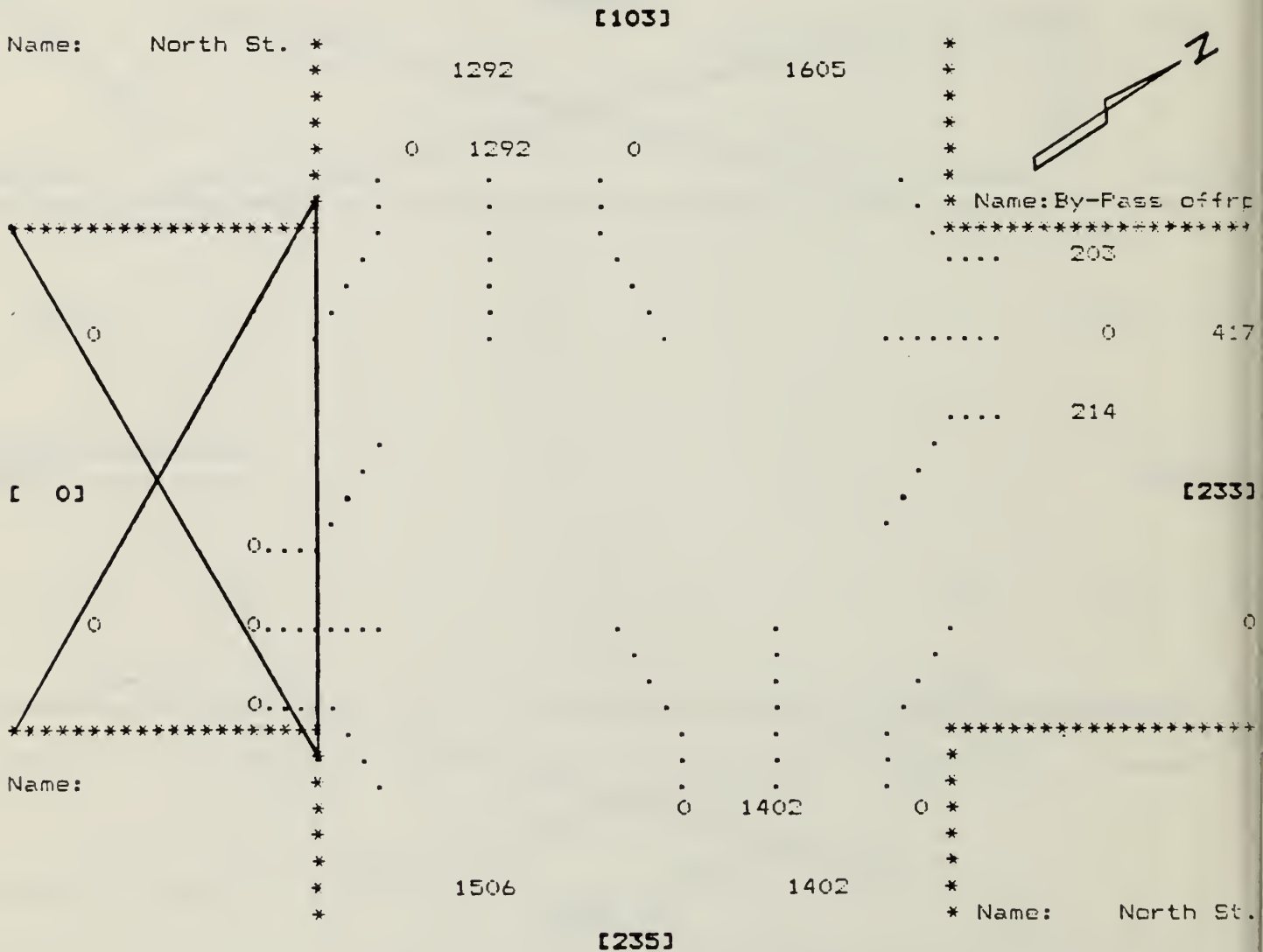
# Central Transportation Planning Staff

## Traffic Simulation Model Turning Movement Summary

Community: Salem

Intersection: By-Pass off ramp at North St.

Year: 2005 Time Period: PM PK HR Scenario: BUILD



Prepared by: EJB Date: 10-11-1985

Node Reference #: 160

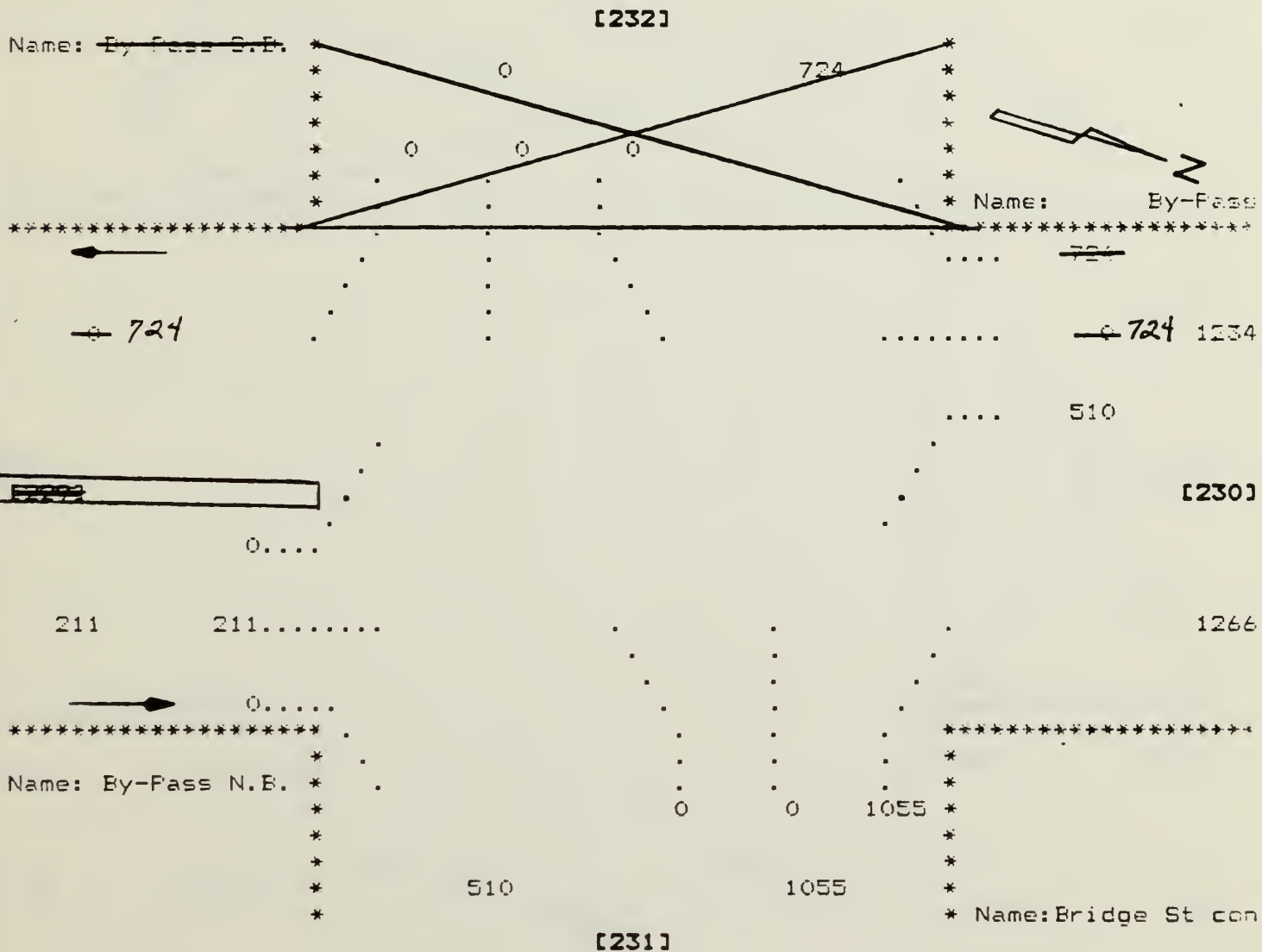
Central Transportation  
Planning Staff

Traffic Simulation Model  
Turning Movement  
Summary

Community: Beverly

Intersection: By-Pass at Bridge St.

Year: 2005 Time Period: PM PK HR Scenario: BUILD



Prepared by: EJB Date: 10-11-1985

Node Reference #: 162



Central Transportation  
Planning Staff

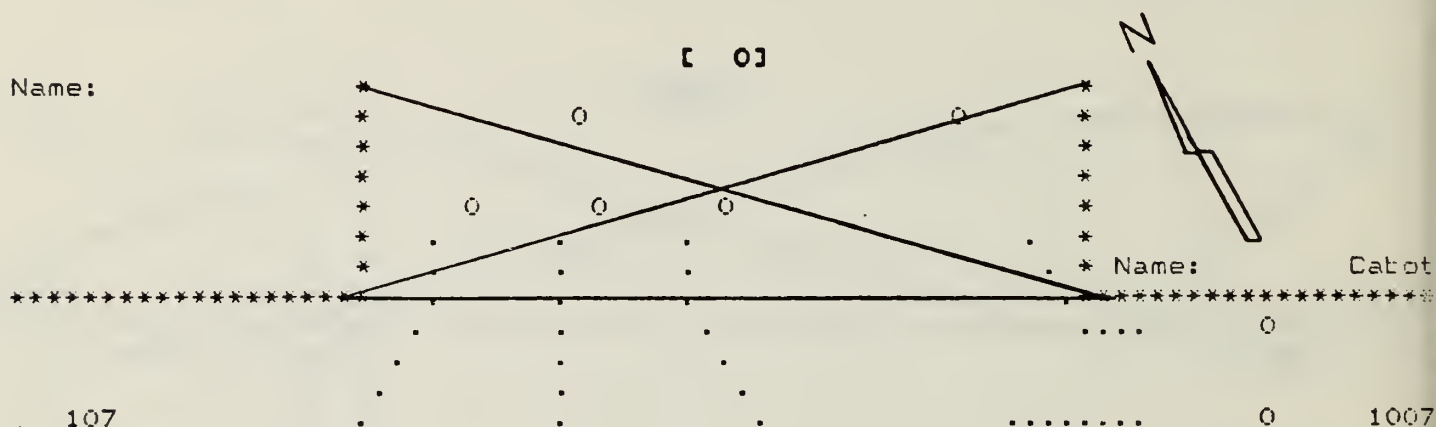
Traffic Simulation Model  
Turning Movement  
Summary

Community: Beverly

Intersection: Bridge at Cabot

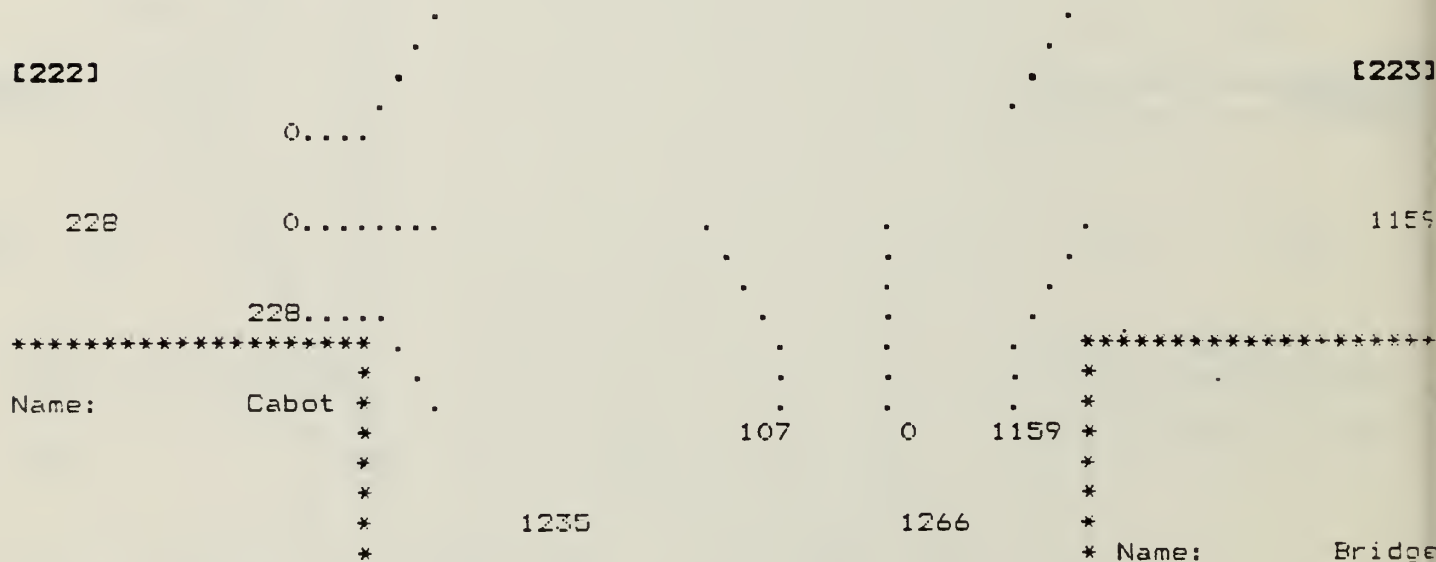
Year: 2005 Time Period: PM PK HR Scenario: BUILD

Name:



[222]

[223]



[230]

Prepared by: EJB Date: 10-11-1985

Node Reference #: 154

# Traffic Simulation Model Turning Movement Summary

Year: 2005      Time Period:      PM PK HR      Scenario:      BUILD





